FIRST EDITION
CATALOG No. 28

Starrett®

WORLD'S GREATEST TOOLMAKERS

PRECISION TOOLS, GAGES and SAWS

1880 1950
Starrett
100th Anniversary

This is our 100th Anniversary Catalog. It is dedicated to craftsmen worldwide who believe in high standards of workmanship and whose loyalty has made possible the success and growth of this company.

BUY THROUGH YOUR DISTRIBUTOR

- MECHANICS' HAND MEASURING TOOLS
- PRECISION INSTRUMENTS
- STEEL TAPES
- ELECTRONIC GAGES
- DIAL INDICATORS
- GAGE BLOCKS AND DIGITAL MEASURING TOOLS
- GRANITE SURFACE PLATES
- COORDINATE MEASURING MACHINES
- MACHINISTS' VISES
- HACKSAWS, BAND SAWS, HOLE SAWS
- GROUND FLAT STOCK

Starrett®

MEASURING INSTRUMENTS
DESIGNED FOR SPACE AGE PRECISION

Whether your measuring system is decimal inch or metric, your measuring needs from millionths to fractions can be met by Starrett precision measuring instruments. The base standards for all Starrett products are our Webber gage blocks. Our laboratory masters are the finest in the world, with accuracies to the phenomenal tolerance of ±.000001" for the decimal inch system and of ±.000027 mm for the metric system.

All tools meet or exceed the accuracy requirements of United States Federal Specifications. Standards used for inspection are traceable to the National Bureau of Standards.

We offer the complete range of Webber Micro-accurate gage blocks as world-wide standards of measurement. To craftsmanship has been added modern research and development—vital to produce instruments with the advanced design required by industry and required by metrology laboratories for increasingly rigid standards of measurement. These modern instruments, the tools of the future designed for space age precision, embody all the craftsmanship and meticulous care that has made the name Starrett world famous since 1880 for quality tools.

All industry measurements, however, are not in millionths. Fully as important are the many other precision instruments required to measure in tenth-thousandths, thousandths, hundredths, fractional measurements, millimeters, centimeters and meters. Starrett makes them all, from the fraction to the millionth. All these instruments are characterized by the same fine craftsmanship and the same modern balanced design necessary to assure the correct accuracy of each particular tool.

To cover this extremely wide range of measurement, the Starrett line includes Gage Blocks, Digital Measuring Instruments, Electronic Gages, Outside Micrometers, Inside Micrometers, Depth Micrometers, Vernier Calipers, Vernier Height Gages, Dial Indicators, Dial Gages, Steel Rules, Steel Tapes, all types of gages and many other tools—over 3,000 in all, in English and Metric.

The Starrett Outside Micrometer is a typical example of modern design applied to one of the most useful tools in industry. "Balanced Design" gives a Starrett Micrometer exactly the right feel regardless of size. Design is matched to size and for big micrometers—7" to 60" or 175 mm to 1500 mm sizes—sleeves, thimbles and spindles are larger with huskier frames. Smaller micrometers—1" to 6" or 25 mm to 150 mm sizes—have proportions balanced for delicate "feel" and handling ease. Modern micrometer design also features *one piece* rigid frames, new sleeve design with easier-reading *staggered* graduations, satin chrome finish and other features.

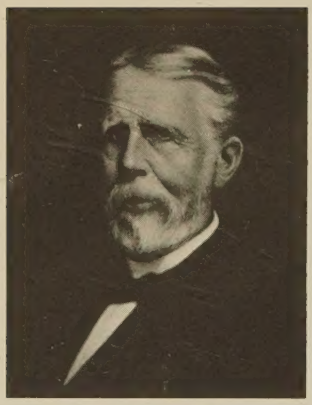
Whether it's micrometers, vernier gages, electronic gages, gage blocks, or any one of hundreds of tools, there's a Starrett instrument to exactly meet your needs. Tenths or millionths, you can count on Starrett for the best measure in modern, high precision tools.

Starrett®

Section Index

	Page
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS	5-272
SPECIAL TOOLS	273-276
STEEL MEASURING TAPES	277-289
ELECTRONIC GAGES	322-325
DIAL INDICATORS, DIAL GAGES	291-364
WEBBER GAGE BLOCKS AND DIGITAL MEASURING TOOLS	365-398
GRANITE SURFACE PLATES	399-418
COORDINATE MEASURING MACHINES	419-434
MACHINISTS' VISES	435-442
HACKSAWS, BAND SAWS, HOLE SAWS	443-484
PRECISION GROUND FLAT STOCK	485-495
VOCATIONAL AND EDUCATIONAL MATERIAL	497-507
REFERENCE TABLES	509-528
INDEX, METRIC TOOLS	529, 530
INDEXES, ALPHABETICAL AND NUMERICAL	531-544

Copyright 1976, The L. S. Starrett Company FIRST EDITION, 1979 Reprinted, 1986 Printed in U.S.A.



L.S. Starrett
(1836-1922)

over 100 Years of Leadership and Service to Industry

For over 100 years, The L. S. Starrett Company has been a symbol of leadership and dependable service in the manufacture of fine precision tools.

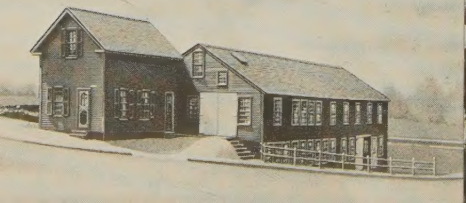
From the first combination square, invented by L. S. Starrett in 1877, the Starrett line has expanded to over 3,000 products used wherever metals and other materials are cut off, laid out, machined, inspected and assembled.

Precision tools, gages, vises and saws are made in Athol, Massachusetts at the main plant below. Precision gage blocks, angle gage blocks, digital readout height gages, optical polygons, gage setting and measuring machines are products of the company's Webber Gage Division in Cleveland, Ohio. Coordinate measuring machines, precision granite surface plates and ground flat stock are manufactured at our plant in Mount Airy, North Carolina.

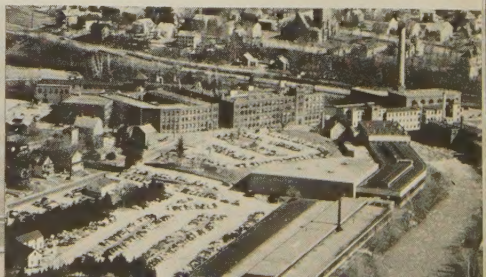
Many Starrett products are also made in overseas plants located in Jedburgh, Scotland and Itu, Brasil. Various company branch offices and manufacturing locations are listed for your convenience on the next page.

The L. S. Starrett Company, Athol, Massachusetts 01331, U.S.A.
Telephone (617) 249-3551 TELEX 294017 LSSA UR
Cable Address: Starrett, Athol

In 1880, the company had its beginnings in this small shop. Here L. S. Starrett, founder, invented and made the first combination square.



Today, company manufacturing facilities include 538,000 sq. ft. of floor space located on both sides of the Millers River in Athol, Massachusetts.



Starrett®

PRECISION TOOLS

Sold throughout the world

Branch Offices and Warehouses

With complete stocks of hacksaw and band saw blades, hole saws, ground flat stock, granite surface plates, machinists' vises and M1 All Purpose Lubricant

Atlanta

The L. S. Starrett Company, P.O. Box 44026, 4520 Commerce Circle Southwest, Atlanta, Georgia 30336
Telephones (404) 691-8046, 47, 48; TWX 810-751-3562

Chicago

The L. S. Starrett Company, 764 Oaklawn Avenue, Elmhurst, Illinois 60126
Telephones (312) 530-7490, 91, 92, 93; TWX 910-254-0171

Cleveland

The L. S. Starrett Company, 24500 Detroit Road, Cleveland, Ohio 44145
Telephone (216) 835-0005; TWX 810-427-9127

Los Angeles

The L. S. Starrett Company, 6920 Hermosa Circle, Buena Park, California 90620
Telephone (714) 739-0323; TWX 910-596-1437

Toronto

The L. S. Starrett Company of Canada Ltd.
1244 Kamato Road, Mississauga, Ontario L4W 1Y1
Telephone (416) 624-2750; TELEX 06-960228

Divisions

Starrett Coordinate Measuring Machine Division
1372 Boggs Drive, P.O. Box 1268, Mount Airy, North Carolina 27030
Telephone (919) 789-5141

Starrett Granite Surface Plate Division
1372 Boggs Drive, P.O. Box 1268, Mount Airy, North Carolina 27030
Telephone (919) 789-5141

Starrett Webber Gage Division
24500 Detroit Road, Cleveland, Ohio 44145
Telephone (216) 835-0001; TWX 427-9172

European and South American Plants

The L. S. Starrett Company Ltd., Jedburgh TD8 6LR, Scotland
Telephone 083 56 2285 and 3501; TELEX 72446 STARRETT G; Cable Address: "Starrett", Jedburgh

Industria E. Comercio L. S. Starrett, Caixa Postal 171, 13.300—Itu, S.P., Brasil
Telephone: Sao Paulo 409-1811; TELEX 1133533 LSST-BR; Cable Address: Starrett-Itu, S.P. Brasil

Starrett®

INDUSTRIAL DISTRIBUTORS

To offer you a convenient, reliable source of supply in your immediate vicinity, ample stocks of Starrett Tools are maintained by leading industrial distributors.

Your Starrett Distributor is ready to serve you at any time and not only provides quick delivery of tools from stock but through his knowledge of the Starrett line and your own personal requirements, is qualified to recommend the best tool for the job as well as help you in any related problems. Your distributor is as close as the nearest phone—feel free to use his services.

GENERAL INFORMATION

No responsibility for claims for consequential damage will be accepted.

PRICES

Since prices are not shown in this catalog, please refer to the separate price supplement issued with this catalog or available from your distributor. All prices are subject to change without notice. All other prices in previous catalogs, bulletins and price sheets if different are hereby cancelled. Discount sheets are available to authorized distributors only on application.

SPECIFICATIONS

Specifications and information appearing in this catalog, while current at the time of printing, are subject to change without notice.

ORDERING

Since Starrett Tools are sold only through authorized Starrett Distributors, individuals and manufacturers should place their orders with one of the distributors in their locality. Names of authorized distributors gladly furnished on request. In ordering, please specify tool number and size. For fastest service, distributor orders for hacksaws, band saws, and ground flat stock should be sent to either Athol, Mass., or branches in Atlanta, Georgia; Chicago, Illinois; Cleveland, Ohio; Los Angeles, California; Toronto, Ontario—whichever is nearest. See addresses, preceding page. Orders for tools, dial indicators and tapes should be sent to Athol.

DUAL NUMBERING

For your ordering convenience, products in this catalog are identified in two ways. First, by catalog number in **bold face type.** Second, by EDP (Electronic Data Processing) number as recommended by the National Industrial Distributors Association and the Southern Industrial Distributors Association. Please order by catalog Number.

MANUFACTURERS' CODE NUMBERS Applying to Starrett Products

Tools	615304
Flat Stock	615173
Saws	615174
Vises	615175
Webber Division	615176
Surface Plate Division	615177
CMM Division	615178

SHIPPING INSTRUCTIONS

Orders should spell out in detail the destination we should ship to. Include name of individual and company; street number and name; city and zip code. Also, please tell us how you want shipment to be made—truck, United Parcel Service, parcel post, for example. If parcel post is requested, be sure to include post office box number. Without specific instructions, we will ship by the least expensive practical route.

CLAIMS

When goods are sold and delivered to the carrier, title transfer automatically to the buyer. If goods are delayed or lost in transit, however, we will make every reasonable effort to trace shipment through the carrier. Lost shipment claims in the U.S. and Canada must be made within 60 days from date of invoice; foreign shipments 90 days from date of invoice. Claims for errors or shortages must be reported immediately on receipt of goods.

RETURNING GOODS

Before goods are returned, authorization must be obtained by writing the factory at 121 Crescent Street, Athol, MA 01331. When writing, mention the order number, its date and explain in as much detail as possible why approval to make the return is being requested. Tools to be repaired should be sent only to the factory—not to any Starrett branch office.

IMPORTANT

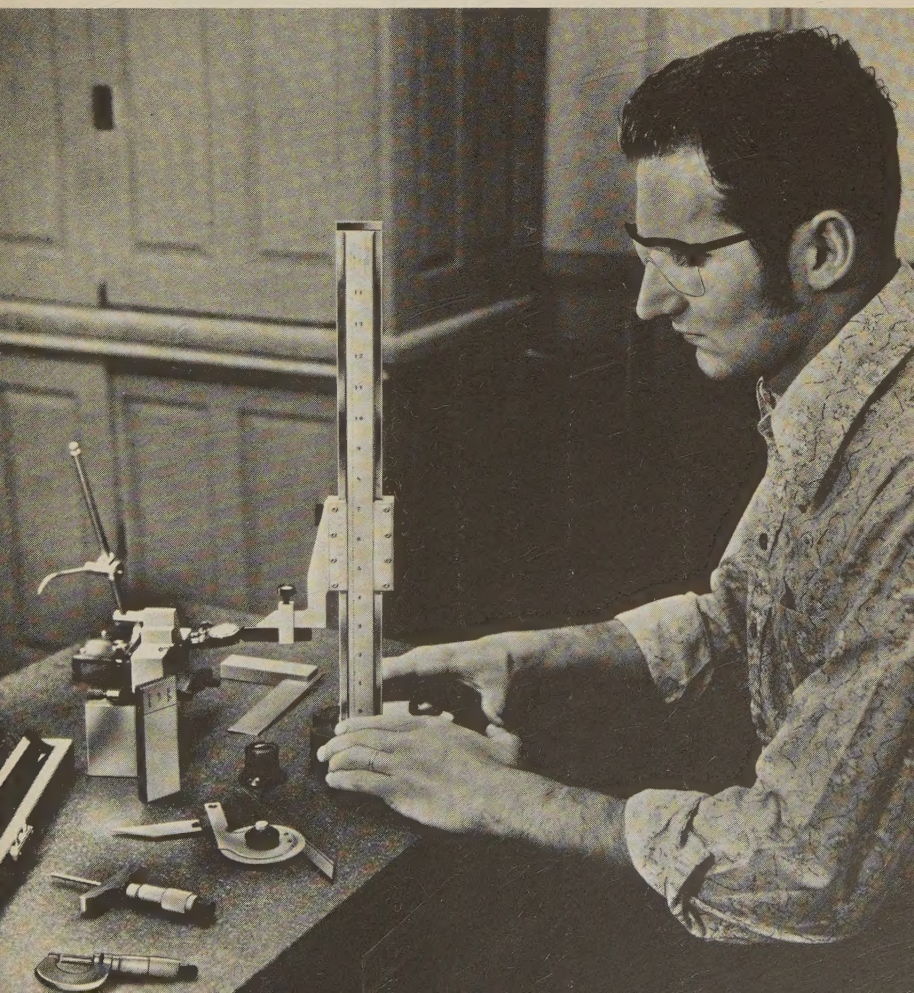
Tools which have been deformed or misaligned, chipped, marred, rusted, stamped or etched cannot be accepted for credit, exchange or replacement. However, we will gladly advise repair costs.

SPECIAL ORDERS

If special tools are required, please send complete information, sketches and dimensions with your order to our Special Order Dept. If such tools vary only slightly from standard tools, quicker delivery and greater economies can be effected by ordering standard tools carried in stock rather than special tools which have to be made to order.

Starrett®

Mechanics' Hand Measuring Tools and Precision Instruments

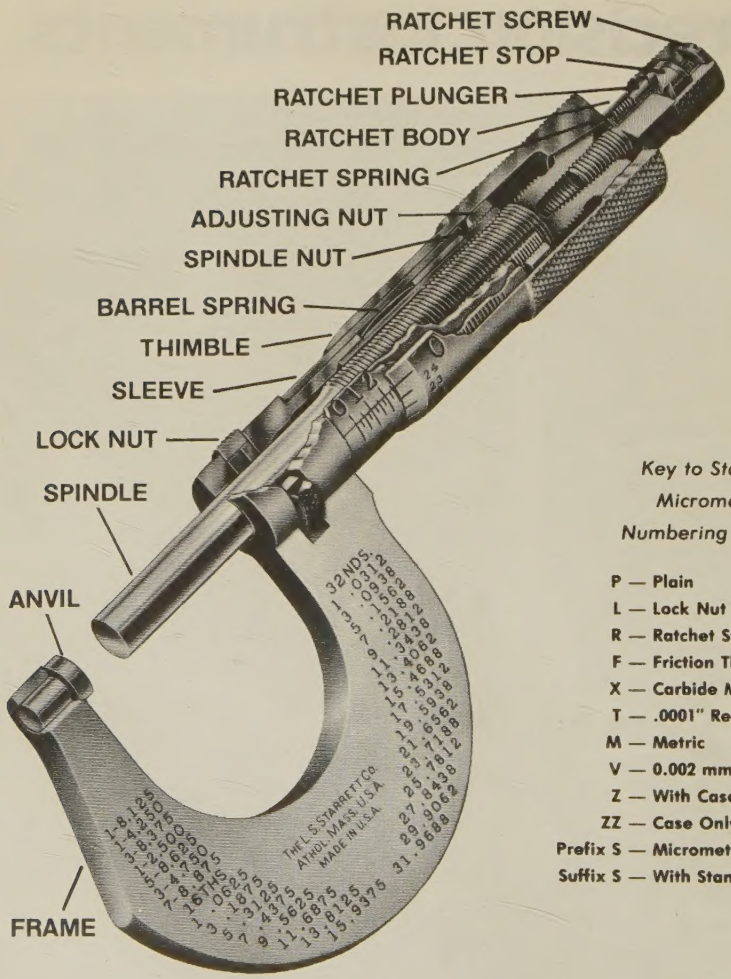


Starrett SATIN CHROME Outside Micrometer Calipers

In buying a micrometer or any other fine tool, the most important factor is selecting a reliable tool that you can depend on. The name Starrett assures this—it's your guarantee of quality and precision. Check the trademark—but check design and workmanship, too.

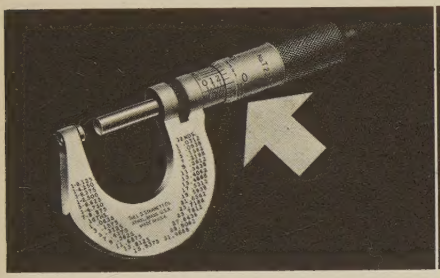
Starrett micrometers are made in a complete range of styles and sizes from ½ to 60 inches, in full finish and black frame types, in both English and metric, to meet every requirement.

Visit your distributor today—let him show you the finest micrometers ever to carry the Starrett name.

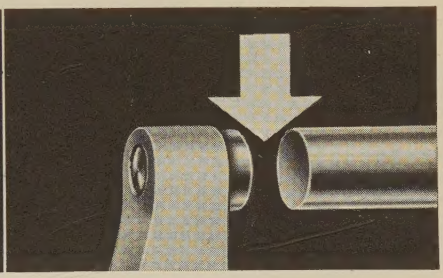


Key to Starrett Micrometer Numbering System

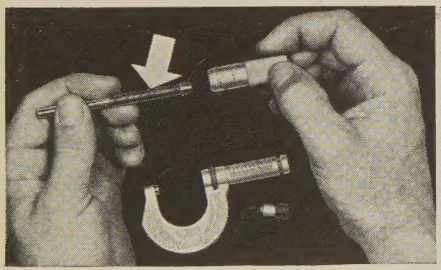
P — Plain
L — Lock Nut
R — Ratchet Stop
F — Friction Thimble
X — Carbide Measuring Faces
T — .0001" Reading
M — Metric
V — 0.002 mm Reading
Z — With Case
ZZ — Case Only
Prefix S — Micrometer Set
Suffix S — With Standards



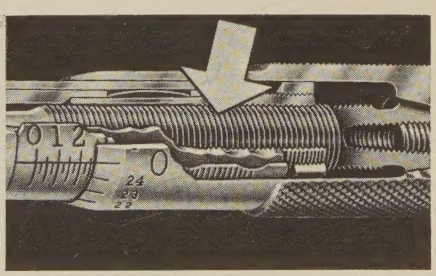
BALANCED DESIGN plus NO-GLARE SATIN-CHROME FINISH—On Thimble and Sleeve of all Micrometers and also on Frame of all Full Finish Micrometers. Easy to Read—Eliminates Eye Strain. Resistant to Stains, Corrosion and Wear.



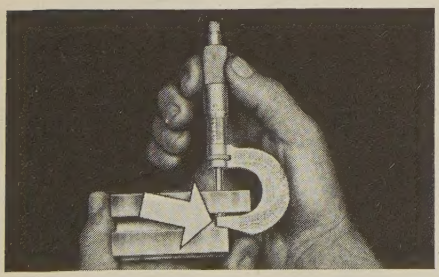
MICRO-LAPPED MIRROR FINISH—On Faces of Anvils and Spindles. Insures More Accurate Measurements. Also Available with Tungsten Carbide Faces.



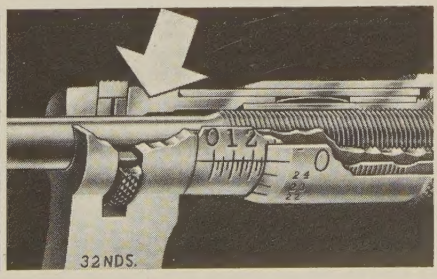
ONE-PIECE SPINDLE—Extra-Rigid Integral Construction for Long, Accurate Life.



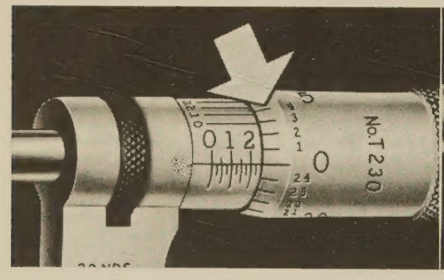
EXTRA HARD THREADS WITH EXTREME LEAD ACCURACY—Special High Carbon Steel Gives Harder Threads Which are Hardened, Stabilized and Precision Ground from the Solid Under Temperature Controlled Conditions to Insure Lasting Precision.



TAPERED FRAME—Permits Measurements in Narrow Slots and Tight Places. Standard with Starrett.

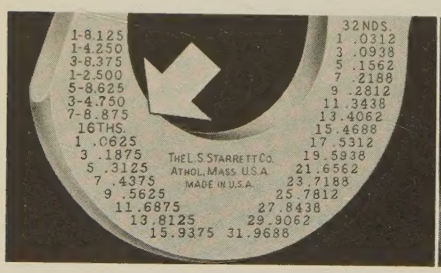


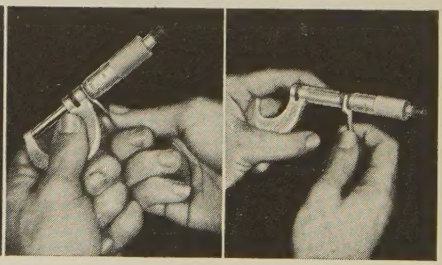
RIGID, ONE-PIECE FRAME—Stem is Integral with Frame for Maximum Rigidity, Accuracy and Long Life.



EASY TO READ—Thimble and Sleeve with Distinct Black Figures and Straight-Line Staggered Graduations Against SATIN-CHROME Finish. Measurements Easy to Read Under Any Illumination.

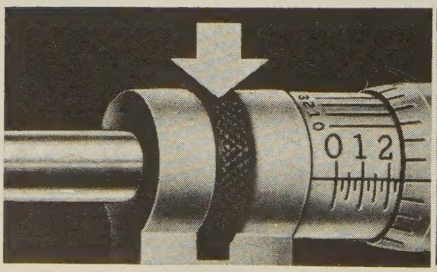
QUICK READING FIGURES—Every Graduation Numbered For Quick, Positive Identification.

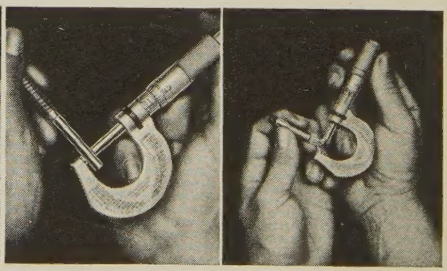




CONVENIENT DECIMAL EQUIVALENTS—of 8ths, 16ths, 32nds and 64ths on Frame or Thimble of All Micrometers.

QUICK, EASY ADJUSTMENT—Only Two Simple Adjustments Maintain Starrett Accuracy. See page 14.

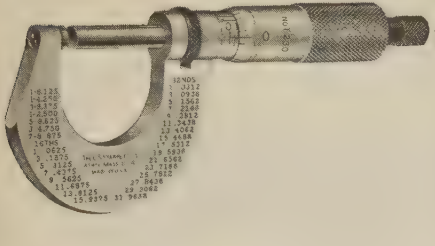




RING-TYPE LOCK NUT—Permits Locking of Spindle At Any Reading. Available At Slight Additional Cost.

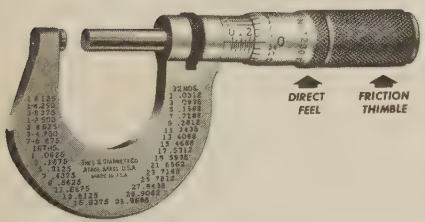
RATCHET STOP OR FRICTION THIMBLE—Permits Consistent Measurements Independent of "Feel." Available At Slight Additional Cost.

Ratchet Stop for Starrett Micrometer Calipers



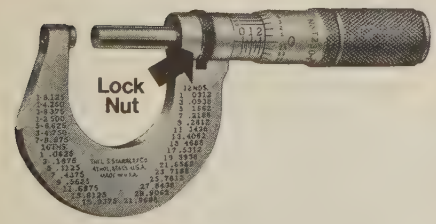
Used to rotate the spindle, the ratchet stop insures consistent, accurate gaging by limiting the spindle pressure on the work—even with different people using the same micrometer. When the pressure reaches a predetermined amount, the ratchet stop slips by the plunger and prevents further turning of the spindle which could cause reading errors or possibly spring the micrometer. Starrett micrometers with ratchet stop are identified with the letter "R" after the catalog number.

Friction Thimble for Starrett Micrometer Calipers



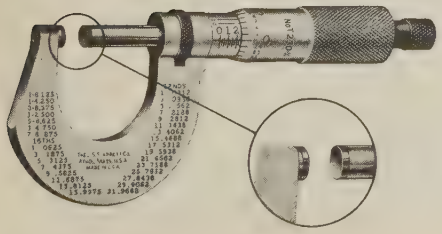
This is a friction control mechanism built into the upper section of the thimble. It insures uniform contact pressure on every measurement while permitting easy one-hand operation of the micrometer. The lower section of the thimble is integral with the screw permitting "direct feel" of the measurement. With the Starrett friction thimble, you get the same sure accuracy every time independent of feel. Micrometers so equipped are identified with the letter "F" after the catalog number.

Lock Nut for Starrett Micrometer Calipers



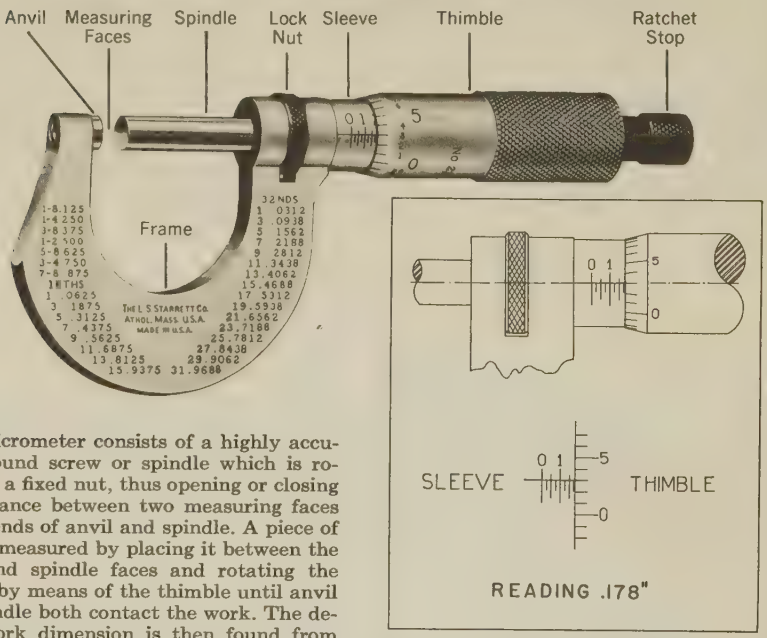
A slight turn of the knurled lock nut ring closes a split bushing around the spindle, locking it in position. The micrometer can thus be locked at any desired reading and made into a solid gage. Starrett micrometers with lock nut are identified with the letter "L" after the catalog number.

Tungsten Carbide Measuring Faces for Starrett Micrometer Calipers



These super hard measuring faces offer greatly extended wear life in general shop use and are strongly recommended for situations where parts are finished by grinding or other abrasive techniques. These faces are micro-lapped flat, parallel and square to the spindle and anvil axis. Starrett micrometers so equipped are identified by the letter "X" after the catalog number.

How to Read a Starrett Micrometer Graduated in Thousandths of an Inch (.001")



THE Micrometer consists of a highly accurate ground screw or spindle which is rotated in a fixed nut, thus opening or closing the distance between two measuring faces on the ends of anvil and spindle. A piece of work is measured by placing it between the anvil and spindle faces and rotating the spindle by means of the thimble until anvil and spindle both contact the work. The desired work dimension is then found from the micrometer reading indicated by the graduations on the sleeve and thimble as described in the following paragraphs.

Since the pitch of the screw thread on the spindle is 1/40" or 40 threads per inch in micrometers graduated to measure in inches, one complete revolution of the thimble advances the spindle face toward or away from the anvil face precisely 1/40 or .025 inches.

The reading line on the sleeve is divided into 40 equal parts by vertical lines that correspond to the number of threads on the spindle. Therefore, each vertical line designates 1/40 or .025 inches and every fourth line which is longer than the others designates hundreds of thousandths. For example: the line marked "1" represents .100", line marked "2" represents .200", and line marked "3" represents .300", etc.

The beveled edge of the thimble is divided into 25 equal parts with each line representing .001" and every line numbered consecutively. Rotating the thimble from one of these lines to the next moves the spindle longitudinally 1/25 of .025" or .001 inches; rotating two divisions represents .002", etc. Twenty-five divisions indicate a complete revolution, .025 or 1/40 of an inch.

To read the micrometer in thousandths, multiply the number of vertical divisions visible on the sleeve by .025", and to this add the number of thousandths indicated by the line on the thimble which coincides with the reading line on the sleeve.

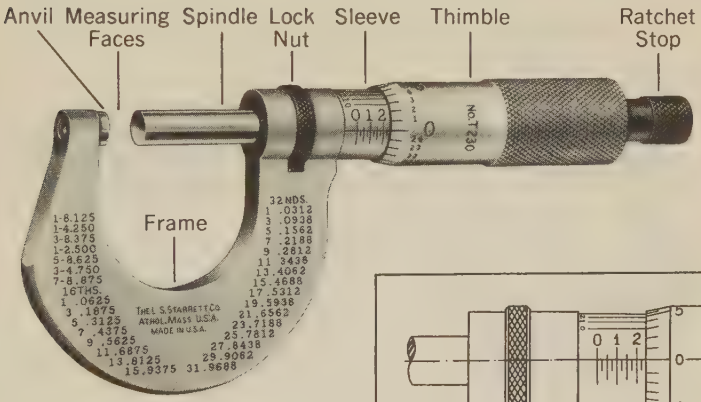
Example: Refer to the illustration above:

The "1" line on sleeve is visible, representing....	.100"
There are 3 additional lines visible, each representing .025".....3 x .025"=	.075"
Line "3" on the thimble coincides with the reading line on the sleeve, each line representing .001".....3 x .001"=	.003"
The micrometer reading is.....	.178"

An easy way to remember, is to think of the various units as if you were making change from a ten dollar bill. Count the figures on the sleeve as dollars, the vertical lines on the sleeve as quarters, and the divisions on the thimble as cents. Add up your change and put a decimal point instead of a dollar sign in front of the figures.

How To Read a Starrett Micrometer

Graduated in Ten-Thousandths of an Inch (.0001″)



STARRETT Micrometers graduated in ten-thousandths of an inch are used like micrometers graduated in thousandths as described on the preceding page, except that an additional reading in ten-thousandths which is obtained from a vernier is added to the thousandth reading.

The vernier consists of ten divisions on the sleeve, shown in figure B, which occupy the same space as nine divisions on the thimble. Therefore, the difference between the width of one of the ten spaces on the vernier and one of the nine spaces on the thimble is one-tenth of a division on the thimble, or one-tenth of one-thousandth, which is one ten-thousandth. To read a ten-thousandths micrometer, first obtain the thousandths reading, then see which of the lines on the vernier coincides with a line on the thimble. If it is the line marked "1" add one ten-thousandth, if it is the line marked "2" add two ten-thousandths, if it is the line marked "3" add three ten-thousandths, etc.

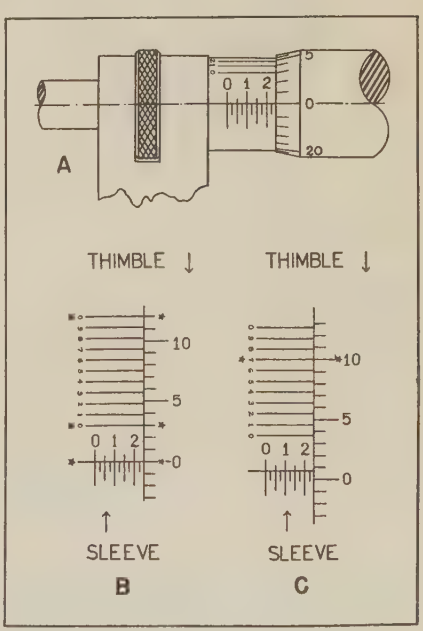


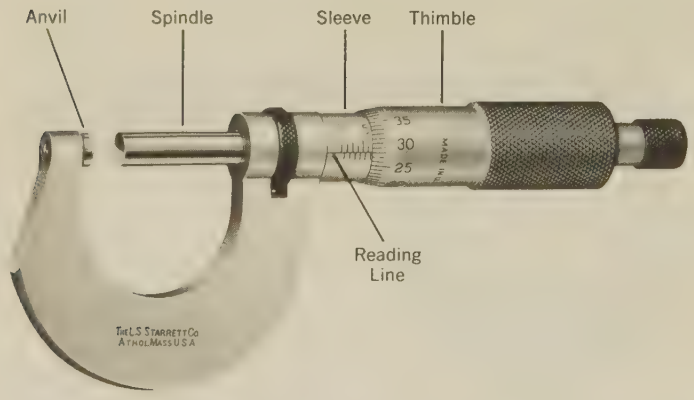
Fig. A & B—Reading .2500″

Example: Refer to figures A and B above.
The "2" line on sleeve is visible, representing.. .200″
There are two additional lines visible, each representing .025″.....2 x .025″=.050″
Line "0" on the thimble coincides with the reading line on the sleeve, representing .... .000″
The "0" lines on the Vernier coincide with lines on the thimble, representing..... .0000″
The Micrometer Reading is..... .2500″

Fig. C—Reading .2507″

Example: Refer to figure C above.
The "2" line on sleeve is visible, representing... .200″
There are two additional lines visible, each representing .025″.....2 x .025″=.050″
The reading line on the sleeve lies between the "0" and "1" on the thimble indicating ten-thousandths of an inch are also to be added as read from the vernier..... .....
The "7" line on the vernier coincides with a line on the thimble, representing..7 x .0001″=.0007″
The Micrometer Reading is..... .2507″

How to Read a Starrett Micrometer Graduated in Hundredths of a Millimeter (0.01 mm)



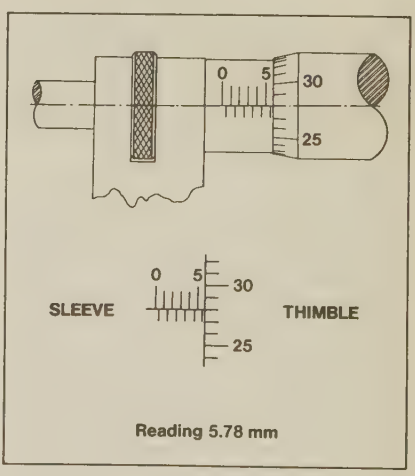
No. 230MRL
Outside Micrometer

Since the pitch of the spindle screw is one-half millimeter (0.5 mm), one revolution of the thimble advances the spindle toward or away from the anvil the same 0.5 mm distance.

The reading line on the sleeve is graduated in millimeters (1.0 mm) with every fifth millimeter being numbered from 0 to 25. Each millimeter is also divided in half (0.5 mm), and it requires two revolutions of the thimble to advance the spindle 1.0 mm.

The beveled edge of the thimble is graduated in 50 divisions, every fifth line being numbered from 0 to 50. Since one revolution of the thimble advances or withdraws the spindle 0.5 mm, each thimble graduation equals 1/50 of 0.5 mm or 0.01 mm. Thus two thimble graduations equal 0.02 mm; three graduations 0.03 mm, etc.

To read the micrometer, add the number of millimeters and half-millimeters visible on the sleeve to the number of hundredths of a millimeter indicated by the thimble graduation which coincides with the reading line on the sleeve.

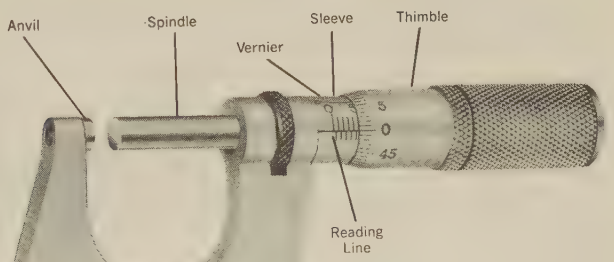


EXAMPLE

Referring to the picture and drawing:

The 5 mm sleeve graduation is visible	5.00 mm
One additional 0.5 mm line is visible on the sleeve	0.50 mm
Line 28 on the thimble coincides with the reading line on the sleeve, so 28 x 0.01 mm ..... =	0.28 mm
The micrometer reading is	5.78 mm

How to Read a Starrett Vernier Micrometer Graduated in Two-Thousandths of a Millimeter (0.002 mm)



No. V230MFL
Outside Micrometer

Metric vernier micrometers are used like those graduated in hundredths of a millimeter (0.01 mm), except that an additional reading in two-thousandths of a millimeter (0.002 mm) is obtained from a vernier scale on the sleeve.

The vernier consists of five divisions each of which equals one-fifth of a thimble division—1/5 of 0.01 mm or 0.002 mm.

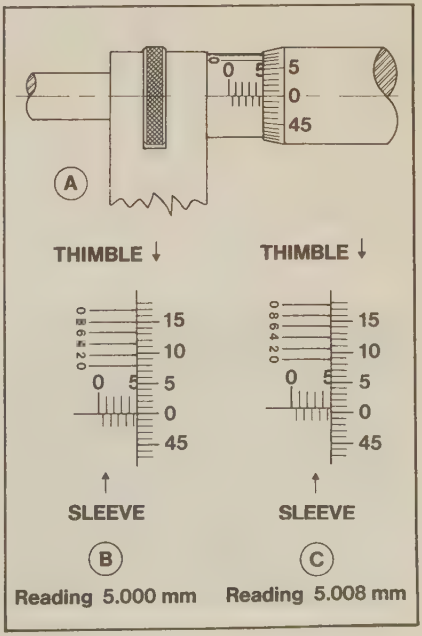
To read the micrometer, obtain a reading to 0.01 mm in the same way shown on the preceding page. Then see which line on the vernier coincides with a line on the thimble. If it is the line marked 2, add 0.002 mm; if it is the line marked 4, add 0.004 mm, etc.

EXAMPLE—Referring to drawings A and B:

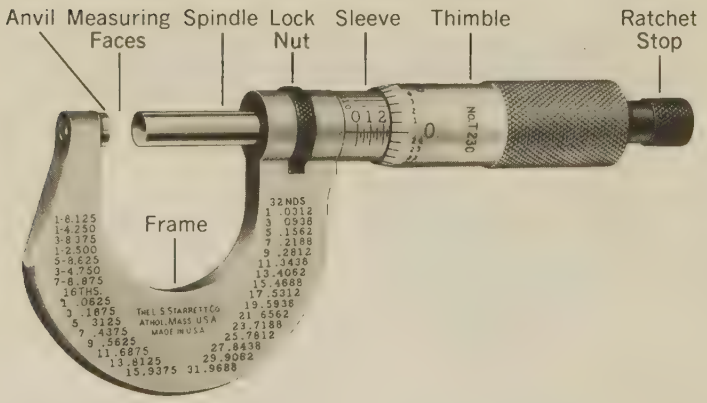
The 5 mm sleeve graduation is visible	5.000 mm
No additional lines on the sleeve are visible	0.000 mm
Line 0 on the thimble coincides with the reading line on the sleeve	0.000 mm
The 0 lines on the vernier coincide with lines on the thimble	0.000 mm
The micrometer reading is	5.000 mm

EXAMPLE—Referring to drawing C:

The 5 mm sleeve graduation is visible	5.000 mm
No additional lines on the sleeve are visible	0.000 mm
Line 0 on the thimble lies below the reading line on the sleeve, indicating that a vernier reading must be added.	
Line 8 on the vernier coincides with a line on the thimble	0.008 mm
The micrometer reading is	5.008 mm



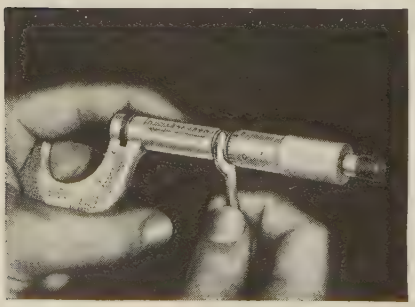
How To Adjust
Starrett Outside Micrometer Calipers



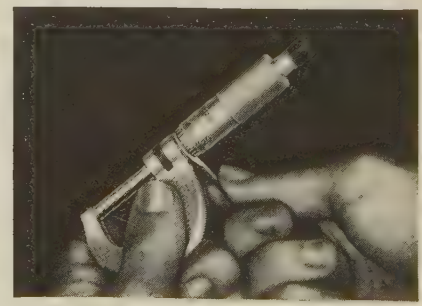
ALTHOUGH adjustment of Starrett Micrometers is rarely needed, in the event it becomes necessary, they can be readily adjusted in two easy operations as follows.

1. If any play should develop in the spindle screw threads due to wear of the spindle nut after long use, first back off the thimble, insert the spanner wrench in the slot of the adjusting nut and tighten just enough to eliminate play. Illustration at lower left shows how easily this is done.

2. After carefully cleaning all dirt or grit from the measuring faces of anvil and spindle, bring them together and insert the spanner wrench in the small slot of the sleeve. Then turn the sleeve until the line on the sleeve coincides with the zero line on the thimble as shown at the lower right.

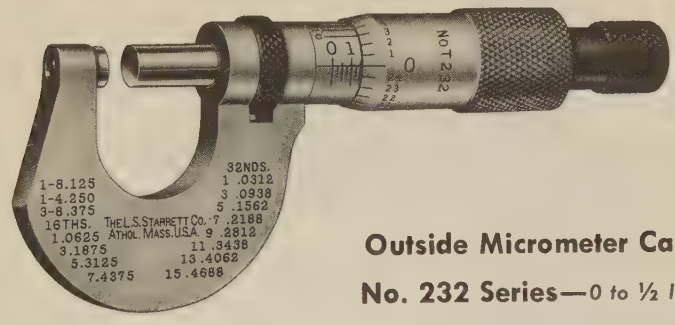


If play develops after long use, back off thimble and tighten adjusting nut to eliminate play in spindle nut.



With anvil and spindle faces in contact, adjust sleeve so that line on sleeve coincides with zero line on thimble.

ALSO AVAILABLE WITH CARBIDE FACES



Starrett No. T232RL one-half inch micrometer illustrated above is graduated in ten-thousandths. No. 232RL graduated in thousandths also available.

Outside Micrometer Calipers

No. 232 Series—*0 to ½ Inch*

No. 232M Series—*0 to 13mm (Metric)*

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Full-Finish Tapered Frame—Permits Use in Narrow Slots and Tight Places**
- ★ **SATIN-CHROME Finish—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces—Also Available with Carbide Faces**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rigid One-Piece Frame—Drop Forged Steel**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents**
- ★ **Quick, Easy Adjustment**
- ★ **Ratchet Stop—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading. Also see page 9.**

FOR MEASURING work ranging up to one half inch in thickness or diameter, the Starrett 0 to ½ inch SATIN-CHROME Micrometer (also in Metric 0 to 13 mm) provides a highly satisfactory precision tool. Although extremely compact and handy to use, it still retains all the advanced features of other Starrett Micrometers in larger sizes.

This micrometer is available with graduations for measuring in thousandths of an inch, ten-thousandths of an inch or hundredths of a millimeter as listed below. All types furnished with handy lock nut and ratchet stop.

Outstanding design throughout, with full finish tapered frame, No-Glare SATIN-CHROME Finish, micro-lapped finish on anvil and spindle faces, one-piece spindle with hardened threads, ground from the solid and stabilized—and other plus-features shown at the right.

Cat. No.	EDP No.	Range	Graduation	Description
232RL	50953	0 to ½"	.001"	With Ratchet Stop and Lock Nut
T232RL	50955	0 to ½"	.0001"	With Ratchet Stop and Lock Nut
		METRIC		
232MRL	50954	0 to 13 mm	0.01 mm	With Ratchet Stop and Lock Nut

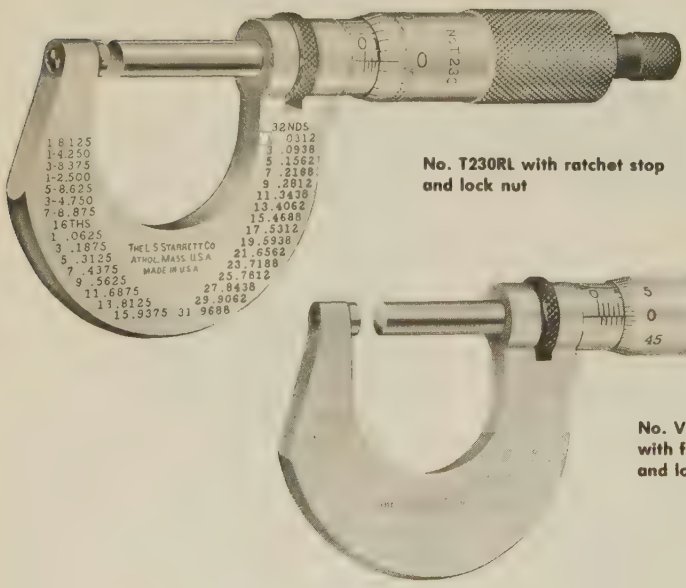
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered

Packed One in a Box

Outside Micrometer Calipers

No. 230 Series—*0 to 1 Inch*

No. 230M Series—*0 to 25 mm (Metric)*



- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Full Finish Tapered Frame—Permits Use in Narrow Slots and Tight Places**
- ★ **SATIN-CHROME Finish—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces—Also Available with Carbide Faces**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rigid One-Piece Frame—Drop Forged Steel**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents**
- ★ **Quick, Easy Adjustment**

Starrett 0 to 1 inch Satin Chrome Micrometers (also 0 to 25 mm metric) are extremely popular for all-around precision measuring. Made with full finish tapered frame, these micrometers have outstanding features that give lasting precision plus fast, easy measurement. Available with graduations for measuring in thousandths of an inch (.001"), ten-thousandths of an inch (.0001"), hundredths of a millimeter (0.01 mm), or two-thousandths of a millimeter (0.002 mm)—and with or without lock nut and ratchet stop. Friction thimble can also be furnished in place of ratchet stop. Also available with tungsten carbide measuring faces.

Outside Micrometer Calipers

No. 230 Series—*0 to 1 Inch*

No. 230M Series—*0 to 25 mm (Metric)*

Cat. No.	EDP No.	Range	Graduation	Description
230P	50932	0 to 1"	.001"	Without ratchet stop, no lock nut
230R	50933	0 to 1"	.001"	With ratchet stop, no lock nut
230L	50934	0 to 1"	.001"	Without ratchet stop, with lock nut
230RL	50935	0 to 1"	.001"	With ratchet stop and lock nut
230XRL	50936	0 to 1"	.001"	With ratchet stop and lock nut; tungsten carbide measuring faces
230F	50937	0 to 1"	.001"	With friction thimble, no lock nut
230FL	50938	0 to 1"	.001"	With friction thimble and lock nut
230XFL	50939	0 to 1"	.001"	With friction thimble and lock nut; tungsten carbide measuring faces
T230P	50940	0 to 1"	.0001"	Without ratchet stop, no lock nut
T230R	50941	0 to 1"	.0001"	With ratchet stop, no lock nut
T230L	50942	0 to 1"	.0001"	Without ratchet stop, with lock nut
T230RL	50943	0 to 1"	.0001"	With ratchet stop and lock nut
T230XRL	50944	0 to 1"	.0001"	With ratchet stop and lock nut; tungsten carbide measuring faces
T230XRLZ	56809	0 to 1"	.0001"	Same as above, in case
T230F	50945	0 to 1"	.0001"	With friction thimble, no lock nut
T230FL	50946	0 to 1"	.0001"	With friction thimble and lock nut
T230XFL	50947	0 to 1"	.0001"	With friction thimble and lock nut; tungsten carbide measuring faces
T230XFLZ	56810	0 to 1"	.0001"	Same as above, in case

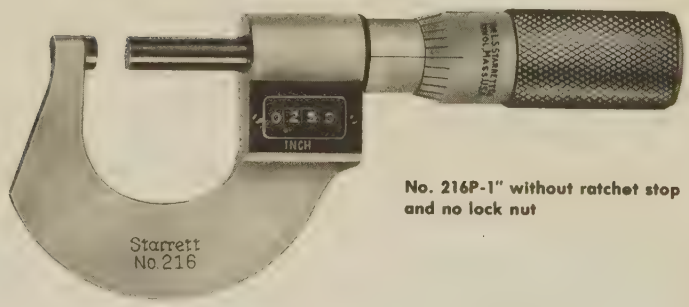
METRIC

230MRL	50948	0 to 25 mm	0.01 mm	With ratchet stop and lock nut
V230MRL	50951	0 to 25 mm	0.002 mm	With ratchet stop and lock nut
V230MFL	50949	0 to 25 mm	0.002 mm	With friction thimble and lock nut

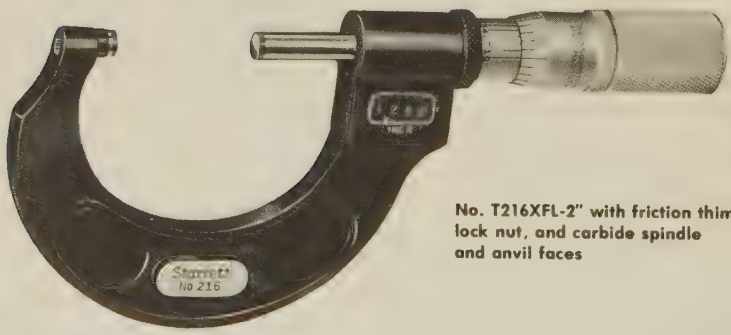
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered

Packed One in a Box

Digital Micrometers
No. 216 Series
No. 216M Series (Metric)



No. 216P-1" without ratchet stop and no lock nut



No. T216XFL-2" with friction thimble, lock nut, and carbide spindle and anvil faces

No. 216 Digital Micrometers make readings faster and easier for every machinist, toolmaker and inspector regardless of degree of experience. Held and used in the conventional way, thousandths of an inch are read directly from a counter. Ten-thousandths of an inch are taken from a quick-reading vernier scale on the micrometer sleeve. The frame-mounted counter saves considerable handling time since its numbers can be read without removing fingers from thimble or micrometer from hand.

Available with ratchet stop or friction thimble to assure repeat accuracy of readings and with lock nut to secure the spindle at any reading. Micro-lapped anvil and spindle faces. Hardened threads ground from the solid and stabilized. Balanced design throughout with rugged one-piece frame of drop-forged steel to assure lasting stability.

1" range micrometers have no-glare satin chrome finish all over; 2" and larger micrometers have black enamel frames with satin chrome finish on thimble and sleeve.

Digital Micrometers
No. 216 and 216M (Metric) Series
Continued

Range	Measuring Faces	Without Ratchet Stop, No Lock Nut		With Ratchet Stop and Lock Nut		With Friction Thimble and Lock Nut	
		Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
Graduation—.001"							
0 to 1"	steel	216P-1	55952	216RL-1	55953	216FL-1	55954
0 to 1"	carbide	216XP-1	55996	216XRL-1	55955	216XFL-1	55956
1 to 2"	steel	216P-2	56152	216RL-2	56153	216FL-2	56257
2 to 3"	steel	216P-3	56204	216RL-3	56205	216FL-3	56206
3 to 4"	steel	216P-4	56207	216RL-4	56208	216FL-4	56209
Graduation—.0001"							
0 to 1"	steel	—	—	T216RL-1	55957	T216FL-1	55958
0 to 1"	carbide	—	—	T216XRL-1	55959	T216XFL-1	55960
1 to 2"	steel	—	—	T216RL-2	56154	T216FL-2	56155
1 to 2"	carbide	—	—	T216XRL-2	56156	T216XFL-2	56157
Graduation—0.01 mm							
0 to 25 mm	steel	216MP-25	55980	216MRL-25	55981	216MFL-25	55982
0 to 25 mm	carbide	216MXP-25	56040	216MXRL-25	55983	216MXFL-25	55984
Graduation—0.002 mm							
0 to 25 mm	steel	—	—	V216MRL-25	56038	V216MFL-25	56039
0 to 25 mm	carbide	—	—	V216MXRL-25	56037	V216MXFL-25	56036

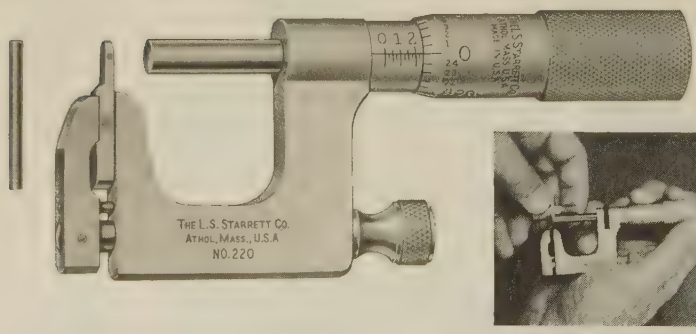
Case Available for All Sizes
Sent Without Case Unless Otherwise Ordered
Packed One in a Box

MUL-T-ANVIL Micrometer Calipers

An Indispensable Tool for Every Toolmaker and Inspector

No. 220 Series—*0 to 1 Inch and 1 to 2 Inch*

No. 220M Series—*0 to 25mm (Metric)*



No. 220CRL-1 with "V" anvil measuring thickness of flange on screw.

ANOTHER brand new development in micrometer design featuring interchangeable anvils. Because of this universal feature, the Starrett No. 220 MUL-T-ANVIL Micrometer will handle a wide variety of measurements impossible to obtain with regular micrometers, such as measuring the wall thickness of tubing, cylindrical walls, from a hole or slot to an edge and many hard-to-reach locations; also thickness of screw heads, shoulder lengths, etc.

Instead of needing many micrometers for this type of work, the mechanic now requires only a set of two MUL-T-ANVIL Micrometers with their interchangeable anvils. Additional anvils of various shapes can be made up by anyone and many of these anvils do not have to be hardened for that "special job" that comes along.

The No. 220 MUL-T-ANVIL Micrometer has a vise type frame which holds interchangeable anvils. Change-over of anvils for different measuring jobs is quick and easy. The desired anvil is placed in the frame vise and after simply tightening a locking screw, the micrometer is ready for use. Two anvils are furnished, a rod anvil approx. .120″ diameter and a flat anvil approx. .125″ and .060″ thick at opposite ends. The rod anvil is useful for measuring wall thickness of tubing, cylinders, etc. and for measuring from a hole to an edge. With the flat anvil, distances from the inside of slots and grooves to an edge can be conveniently measured. In addition to the two anvils described above, this micrometer is also available with a third V-anvil for measuring thickness of screw heads, shoulder lengths, etc. Other special anvils up to 5/16″ thick also can be used with this micrometer. Special anvils quoted on application.

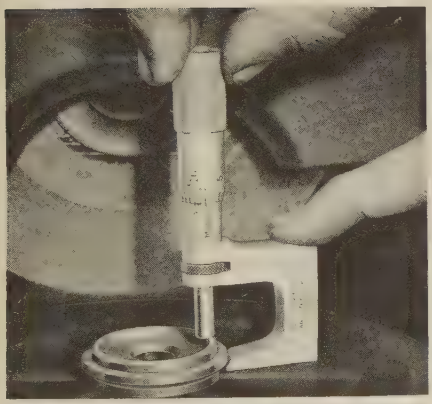
This micrometer is available in 0 to 1 inch and 1 to 2 inch sizes and reads in thousandths of an inch. Also features Balanced Design, No-Glare SATIN-CHROME Finish, spindle hardened and ground from the solid, micro-lapped spindle face, Quick Reading graduations, etc.

MUL-T-ANVIL Micrometer Calipers

No. 220 Series— *0 to 1 Inch and 1 to 2 Inch*

No. 220M Series— *0 to 25 mm (Metric)*

Continued



The micrometer can also be quickly converted into a handy height gage for many applications by simply removing the clamping vise jaw.

- ★ **Interchangeable Anvils—Permit Quick Accurate Measurement of Tubing. Cylindrical Walls, from a Hole or Slot to an Edge, and in Many Hard-to-Reach Locations**
- ★ **Two Anvils Furnished—Round Anvil Approx. .120" Diameter and Flat Anvil Approx. .125" and .060" Thick**
- ★ **Also Available with V-Anvil for Measuring Thickness of Screw Heads, Shoulder Lengths**
- ★ **Anvils Rigidly Held in Vise Type Frame and Quickly Interchanged by Single Lock Screw Adjustment**
- ★ **Accommodates Special Anvils up to 5/16" Thick**
- ★ **Can be Used as Height Gage by Removing Vise Jaw**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**

Range	Graduation	Without Ratchet Stop, No Lock Nut		With Ratchet Stop and Lock Nut		With Friction Thimble and Lock Nut	
		Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
WITH ROUND AND FLAT ANVILS							
0 to 1"	.001"	220AP-1	50737	220ARL-1	50738	220AFL-1	50739
0 to 25 mm	0.01 mm	220MAP-25	56239	220MARL-25	50752	220MAFL-25	56320
WITH ROUND, FLAT AND "V" ANVILS*							
0 to 1"	.001"	220CP-1	50740	220CRL-1	50741	220CFL-1	50742
0 to 25 mm	0.01 mm	—	—	220MCRL-25	56240	—	—
WITH ROUND AND FLAT ANVILS And With No. 234B-1 (EDP No. 51017) End Measuring Rod or Standard							
1 to 2"	.001"	220AP-2	50748	220ARL-2	50749	220AFL-2	50750

*NOTE: Part No. 13017 (EDP No. 71399) V-Anvil also available separately.

NOTE: No. 220AP-1, No. 220AFL-1 and No. 220CFL-1 also available with Tungsten Carbide face on spindle only.

Sent Without Ratchet Stop, Lock Nut, Case and With Round and Flat Anvils Unless Otherwise Ordered.

Available With Attractive Protective Case—Sent Without Case Unless Otherwise Ordered.

Packed One in a Box

HI-PRECISION Outside Micrometer Caliper—No. 221

0 to 1 Inch

The Only Micrometer That Gives You These Features!

- ★ **Provides Instant Direct Readings in Ten-Thousandths of an Inch—No Vernier Readings Necessary**
- ★ **Speeds Up Measurements at Top Accuracy—Eliminates "Feel"—Gives Gagemaker Skill to Every Mechanic**
- ★ **Gives Consistent Spindle Pressure For All Readings**
- ★ **Automatically Insures the Right Measurement Every Time**

No. 221 Hi-Precision Micrometer permits direct readings in ten-thousandths of an inch plus automatic control of spindle pressure. Faster measurements at top precision are therefore possible and necessity to "feel" the work is eliminated—giving gagemaker skill to every mechanic.

This micrometer features an inner thimble reading in thousandths and a red graduated thimble with large, widely spaced graduations which gives direct readings in ten-thousandths.

It also features an exclusive constant-pressure mechanism which eliminates "feel" and automatically insures consistent spindle pressure for every measurement. Extremely easy to use—simply turn the thimble until the nearest "thousandth" thimble graduation coincides with the sleeve horizontal line and add the readings as explained below.

Other features include balanced design, satin chrome finish, hardened and ground spindle, micro-lapped anvil and spindle faces, quick reading graduations, convenient decimal equivalents.

Cat. No.	EDP No.	Range	Graduation	Description
T221L	50753	0 to 1"	.0001"	With Lock Nut
T221XL	50754	0 to 1"	.0001"	With Lock Nut; Tungsten Carbide Measuring Faces

NOTE: Constant Pressure Mechanism Available on Micrometers in Larger Sizes on Special Order

Available With Attractive Protective Case—Sent Without Case Unless Otherwise Ordered—Packed One in a Box

How to Read a Starrett HI-PRECISION Micrometer

This micrometer is accurate within .00005" throughout the range.

Instructions—The red graduated thimble carries the ten-thousandths graduations and the inner thimble carries the thousandths graduations (see illustration above).

1. It is essential that the work to be measured, and the spindle and anvil faces be clean.

2. Using the micrometer conventionally, bring the measuring faces up snug to the piece being measured, and then "load" the micrometer by continuing to rotate the red graduated thimble through ten of its divisions.

3. Let the red graduated thimble return until the .001" graduation on the inner thimble lines up with the reading line on the sleeve.

4. Now take the .0001" reading directly from the red graduated thimble and add to the thousandths reading.

NOTE: Do not force the red graduated thimble if you feel it hit the stop. Do not let the red graduated thimble snap back from its "loaded" position.

V-Anvil Micrometer Calipers

No. 483 Series— *.093 to 1 Inch and 1 to 2 Inch*

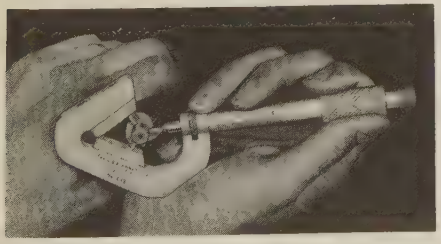
No. 483M Series— *2 to 25 mm (Metric)*

No. 485 Series— *.078 to 1 Inch*

- ★ **Double Purpose Micrometers—No. 483 Ideal for Checking Out-of-Roundness in Centerless Grinding, Machining Operations**
- ★ **No. 483 and No. 485 also Specially Designed for Measuring Odd Fluted Cutting Tools**
- ★ **Direct Reading Eliminates Use of Special Fixtures**
- ★ **Precision Aligned Anvils to Match Index of Cutter Teeth**
- ★ **Carbide Facings on Spindle and Anvil for Extra-Long Wear**
- ★ **Hardened, Ground-from-the-Solid Spindle Threads for Accurate Reading**
- ★ **No-Glare SATIN-CHROME Finish**

If there is a centerless grinding operation in your shop, you can use No. 483 V-Anvil Micrometers to check out-of-roundness, a condition that cannot be measured on the conventional micrometer. Because of three-point contact, out-of-roundness errors show up immediately. This micrometer can also be used for any other machining operation where out-of-roundness is a problem.

Both No. 483 and No. 485 V-Anvil Micrometers measure the diameter of odd-fluted taps, milling cutters, reamers, and are used like any conventional outside micrometer. Hold the cutter in one hand and turn the spindle face against one cutting edge (making sure that the cutting edge lines up with the spindle axis). Then take the reading directly from the micrometer thimble.



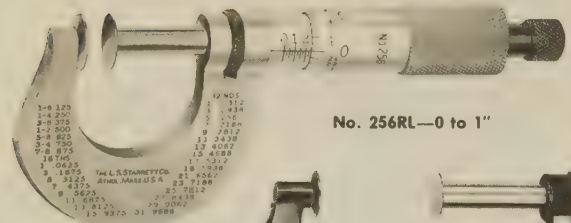
Measuring outside diameter of 3-fluted counterbore.

Checking out-of-roundness on centerless grinding work with No. 483.

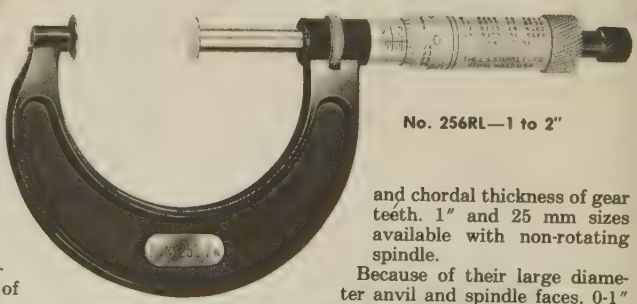
Cat. No.	EDP No.	Range	Graduation	No. of Flutes will Measure	Description
483XRL-1	52490	.093 to 1"	.001"	3	With Ratchet Stop and Lock Nut
T483XRL-1	52491	.093 to 1"	.0001"	3	With Ratchet Stop and Lock Nut
483XRL-2	52493	1 to 2"	.001"	3	With Ratchet Stop and Lock Nut
T483XRL-2	52494	1 to 2"	.0001"	3	With Ratchet Stop and Lock Nut
485XRL	52496	.078 to 1"	.001"	5	With Ratchet Stop and Lock Nut
T485XRL	52497	.078 to 1"	.0001"	5	With Ratchet Stop and Lock Nut
			METRIC		
483MXRL-25	56046	2 to 25 mm	0.01 mm	3	With Ratchet Stop and Lock Nut
485MXRL	56047	2 to 25 mm	0.01 mm	5	With Ratchet Stop and Lock Nut

Available With Attractive, Protective Case; Sent Without Case Unless Otherwise Ordered
Packed One in a Box

Disc Type Micrometers
No. 256 Series
No. 256M Series



No. 256RL—0 to 1"



No. 256RL—1 to 2"

If you have a problem gaging the thickness of lands or sections bounded by grooves or slots as narrow as .015", you need one of these disc micrometers.

Their thin, tapered anvil and spindle discs—1/2" diameter, 1/16" at the center tapering to .015" edge thickness—enter narrow grooves, slots and recesses, making possible the thickness measurement of work sections such as ribs, lands, fins; cutting edges on form tools; and chordal thickness of gear teeth. 1" and 25 mm sizes available with non-rotating spindle.

Because of their large diameter anvil and spindle faces, 0-1" and 0-25 mm micrometers are also useful for measuring the thickness of sheet materials like paper, cardboard, rubber and plastics.

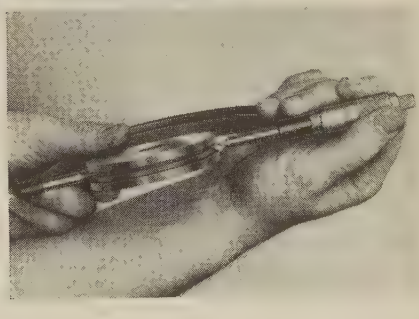
0-1" and 0-25 mm sizes have no-glare satin chrome finish all over. Larger sizes have satin chrome finish on reading surfaces and smooth black enamel finish on frames.

Cat. No.	EDP No.	Range	Graduation	Description
256P-1	51235	0 to 1"	.001"	Without Ratchet Stop, No Lock Nut
256RL-1	51236	0 to 1"	.001"	With Ratchet Stop and Lock Nut
256PN-1	56469	0 to 1"	.001"	Without Ratchet Stop, No Lock Nut, With Non-Rotating Spindle
256RL-2	55940	1 to 2"	.001"	With Ratchet Stop and Lock Nut
256RL-3	55941	2 to 3"	.001"	With Ratchet Stop and Lock Nut
		METRIC		
256MP-25	51237	0 to 25 mm	0.01 mm	Without Ratchet Stop, No Lock Nut
256MRL-25	51238	0 to 25 mm	0.01 mm	With Ratchet Stop and Lock Nut
256MPN-25	56470	0 to 25 mm	0.01 mm	Without Ratchet Stop, No Lock Nut, With Non-Rotating Spindle
256MRL-50	55942	25 to 50 mm	0.01 mm	With Ratchet Stop and Lock Nut
256MRL-75	55943	50 to 75 mm	0.01 mm	With Ratchet Stop and Lock Nut

0-1" and 0-25 mm Micrometers Available with No. 910 Case
1-2" and 25-50 mm Micrometers Available with No. 913 Case
2-3" and 50-75 mm Micrometers Available with Attractive, Protective Case
Sent Without Case Unless Oherwise Ordered
Packed One in a Box

Blade Type Micrometers
No. 486 Series—*0 to 6 Inch*

No. 486 Micrometer checking root diameter of circular form tool.



- ★ **Balanced Design with Starrett Toolmaker Engineered Features—Insures Perfect Balance, Easy Handling, Better Readability**
- ★ **Blade Type Anvil and Spindle—For Easy, Accurate Measurement of Circular Formed Tools, also Diameter and Depth of Narrow Grooves, Slots, Keyways, Recesses, Shallow Depths, between Lands and Fins**
- ★ **Non-Rotating Spindle—Prevents Blade Turning in Narrow Slots or Rolling off Shoulders**
- ★ **Blades .030" Thick, Measure 5/16" Depths**
- ★ **Specially Forged, Black Enameled Frame with SATIN-CHROME Finish on Sleeve and Thimble**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents**
- ★ **Quick Easy Adjustment**
- ★ **Convenient Speeder on End of Thimble—For Faster Settings and Measurements**

Here's another new Starrett micrometer designed for fast, accurate measurement of circular form tools as well as the diameter and depth of all types of narrow grooves, slots, keyways, recesses, shallow depths, between lands and fins.

Blade type anvil and spindle makes such measurements possible on this No. 486 Micrometer, plus a non-rotating spindle which advances to contact the work without turning. This feature permits measuring depth of narrow shoulders without the blade rolling off and convenient measurement of all types of narrow slots and recesses. Both blades are .030" thick and will measure to a depth of 5/16".

The Starrett No. 486 Micrometer is available in six sizes: 0 to 1 inch; 1 to 2 inches; 2 to 3 inches; 3 to 4 inches; 4 to 5 inches; 5 to 6 inches. Graduations are in thousandths of an inch.

A convenient speeder on the end of the thimble makes possible fast settings, quick measurements. The micrometer also features a specially forged, black enameled frame with satin chrome finish on sleeve and thimble; quick reading figures, and other precision refinements listed above.

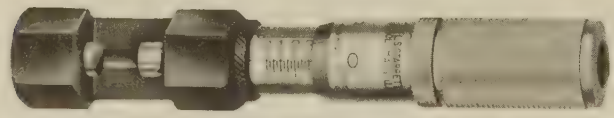
Cat. No.	EDP No.	Range	Graduation	Description
486P-1	52499	0 to 1"	.001"	With Speeder
486P-2	52501	1 to 2"	.001"	With Speeder
486P-3	52503	2 to 3"	.001"	With Speeder
486P-4	52505	3 to 4"	.001"	With Speeder
486P-5	52507	4 to 5"	.001"	With Speeder
486P-6	52509	5 to 6"	.001"	With Speeder

NOTE: 1" size available in attractive, protective case; 2", 3", 4", 5", 6" sizes in wood cases.

Sent without Case unless otherwise ordered.

Packed One in a Box

Wire Micrometer No. T225F



ANOTHER new Starrett micrometer, the No. T225F Wire Micrometer with new improved features. This micrometer is specially designed to measure diameters of wire and has a range of 0–.400″.

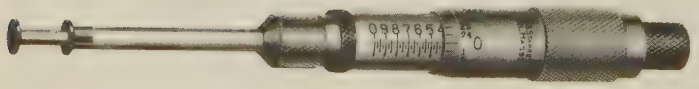
An outstanding feature is the hex body—permits wire to be measured without the micrometer rolling over when placed on a flat surface. Throat of body is flat to support the wire when measuring. Thimble and sleeve have Satin Chrome finish with staggered graduations in .0001″; body has black pentrate finish.

Cat. No.	EDP No.	Range	Graduation	Description
T225F	50814	0 to .400″	.0001″	With Friction Thimble

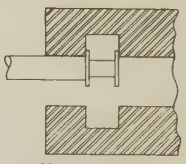
Furnished in Attractive, Protective Case

Packed One in a Box

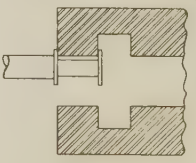
Groove Micrometer No. 260Z



WIDTHS of either internal or external grooves and lands can be quickly measured on the new Starrett No. 260 Groove Micrometer. Graduated in .001″ and has a reach of 1⅝″ max. hole depth. Will measure groove widths from .050″ to 1.050″ and land widths from 0 to 1.000″. Each measuring disc is 3/32″ O.D., .025″ thick and hardened, ground and lapped. Satin Chrome finish with quick-reading, staggered graduations.



Measures Grooves
Range: .050″ to 1.050″
(Add .050″ to reading)



Measures Lands
Range: 0 to 1.000″

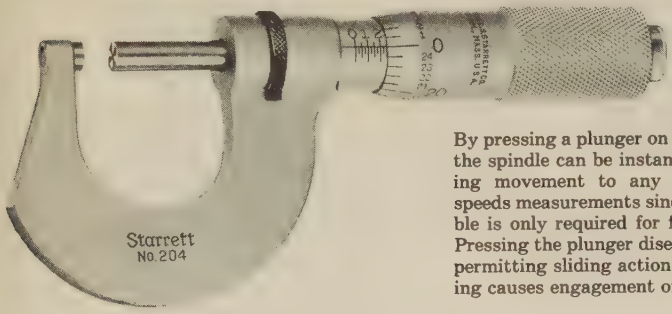
Cat. No.	EDP No.	Graduation	Range Groove Widths*	Land Widths	Max. Hole Depth
260Z	51250	.001″	.050″–1.050″	0–1.000″	1⅝″

*Add .050″ to micrometer reading.

Furnished in Attractive, Protective Case

Packed One in a Box

Quick Adjusting Outside Micrometer Caliper No. 204L—*0 to 1 Inch*



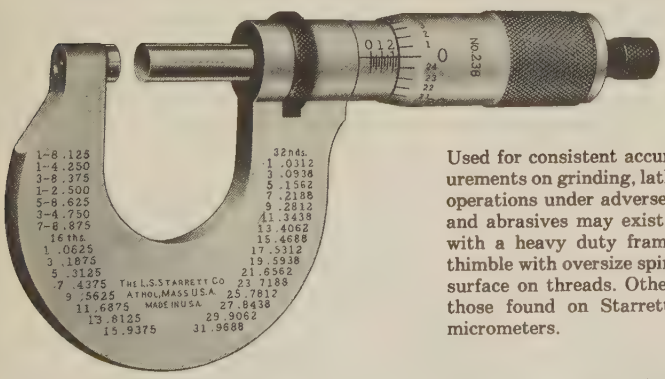
By pressing a plunger on the end of the thimble, the spindle can be instantly adjusted by a sliding movement to any desired setting. This speeds measurements since rotation of the thimble is only required for final size adjustment. Pressing the plunger disengages the spindle nut permitting sliding action of the spindle. Releasing causes engagement of the spindle nut.

Cat. No.	EDP No.	Range	Graduation	Description
204L	56259	0 to 1"	.001"	With Lock Nut

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

Heavy Duty Outside Micrometer Calipers

No. 238 Series—*0 to 1 Inch* No. 238M Series—*0 to 25 mm (Metric)*



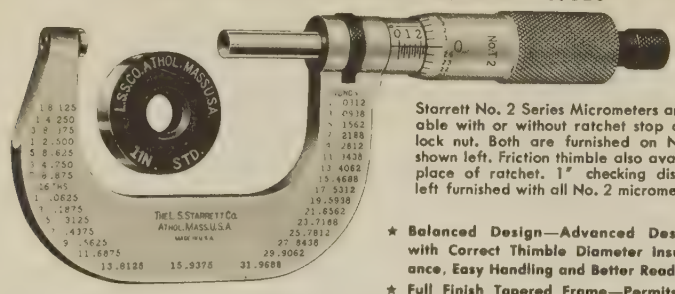
Used for consistent accuracy in repeated measurements on grinding, lathe and milling machine operations under adverse conditions where dirt and abrasives may exist. Rugged construction with a heavy duty frame plus an extra large thimble with oversize spindle and larger bearing surface on threads. Other features identical to those found on Starrett standard full finish micrometers.

Cat. No.	EDP No.	Range	Graduation	Description
238RL	51082	0 to 1"	.001"	With Ratchet Stop and Lock Nut
T238RL	51084	0 to 1"	.0001"	With Ratchet Stop and Lock Nut
			METRIC	
238MRL	51083	0 to 25 mm	0.01 mm	With Ratchet Stop and Lock Nut

NOTE: Also see page 33 for 1-2 up to 5-6 inch Heavy Duty Micrometers.

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

ALSO AVAILABLE WITH CARBIDE FACES



Starrett No. 2 Series Micrometers are available with or without ratchet stop and with lock nut. Both are furnished on No. T2RL shown left. Friction thimble also available in place of ratchet. 1" checking disc shown left furnished with all No. 2 micrometers.

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Full Finish Tapered Frame—Permits Use in Narrow Slots and Tight Places**
- ★ **SATIN-CHROME Finish—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces. Also Available with Carbide Faces**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rigid One-Piece Frame—Drop Forged Steel**
- ★ **Convenient Decimal Equivalents**
- ★ **Ratchet Stop or Friction Thimble—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading. Also see page 9.**

Outside Micrometer Calipers

No. 2 Series—*1 to 2 Inch*

No. 2M Series—*25 to 50 mm (metric)*

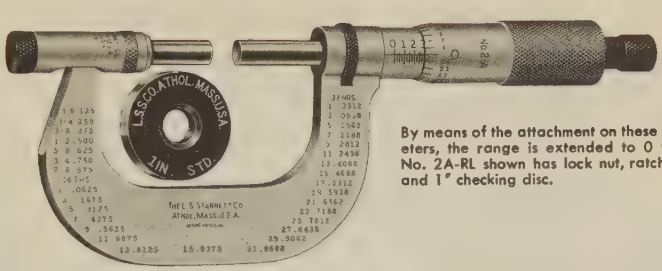
With greater capacity of 1 to 2 inches, Starrett 1 to 2 inch SATIN-CHROME Micrometers (also in Metric 25 to 50 mm) are ideal for measuring work in this size range and to supplement the 0 to ½ and 0 to 1 inch micrometers described on preceding pages.

The frame is full finish in No-Glare SATIN-CHROME and has tapered construction for measuring in narrow slots and tight places. Features include micro-lapped finish on anvil and spindle faces, one-piece spindle with threads hardened, ground from the solid and stabilized—and all the outstanding advantages of other Starrett Micrometers as listed above.

All of these micrometrs are furnished with lock nut and 1 inch checking disc and are available with or without Ratchet Stop or Friction Thimble. Also available with graduations in thousandths of an inch, ten-thousandths of an inch, hundredths of a millimeter or two thousandths of a millimeter.

Cat. No.	EDP No.	Range	Graduation	Description
2L	50012	1 to 2"	.001"	Without Ratchet Stop, With Lock Nut and 1" Checking Disc
2RL	50013	1 to 2"	.001"	With Ratchet Stop, Lock Nut and 1" Checking Disc
2FL	50014	1 to 2"	.001"	With Friction Thimble, Lock Nut and 1" Checking Disc
T2L	50015	1 to 2"	.0001"	Without Ratchet Stop, With Lock Nut and 1" Checking Disc
T2RL	50016	1 to 2"	.0001"	With Ratchet Stop, Lock Nut and 1" Checking Disc
T2FL	50017	1 to 2"	.0001"	With Friction Thimble, Lock Nut and 1" Checking Disc
2D	50031	1" Checking Disc only		
			METRIC	
2MRL	50018	25 to 50 mm	0.01 mm	With Ratchet Stop, Lock Nut and 25 mm Checking Disc
V2MRL	56685	25 to 50 mm	0.002 mm	With Ratchet Stop, Lock Nut and 25 mm Checking Disc
V2MFL	56686	25 to 50 mm	0.002 mm	With Friction Thimble, Lock Nut and 25 mm Checking Disc
2MD	50032	25 mm Checking Disc only		

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box



By means of the attachment on these micrometers, the range is extended to 0 to 2 in. No. 2A-RL shown has lock nut, ratchet stop, and 1" checking disc.

Outside Micrometer Calipers With Attachment

No. 2A Series—*0 to 2 Inch*

No. 2MA Series—*0 to 50mm (Metric)*

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Attachment Permits Measurements 0 to 1"—Without Attachment, 1 to 2"**
- ★ **Full Finish Tapered Frame—Permits Use in Narrow Slots and Tight Places without Attachment**
- ★ **SATIN-CHROME Finish—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces**
- ★ **One-Piece Extra-Rigid Spindle with Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rigid One-Piece Frame—Drop Forged Steel**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents**
- ★ **Quick, Easy Adjustment**
- ★ **Ratchet Stop or Friction Thimble—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading. Also see page 9.**

THESE Starrett SATIN-CHROME Micrometers consist of a 1 to 2 inch No. 2 Series micrometer with a No. 212 attachment, thereby providing a total measuring capacity of 0 to 2 inches (also in Metric 0 to 50 mm).

The attachment can be easily applied and when in position as illustrated above, the micrometer has a capacity of 0 to 1 inch; without the attachment, range is 1 to 2 inches.

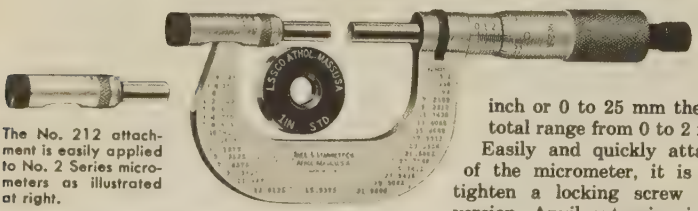
Aside from the attachment, these micrometers are identical with the 1 to 2 inch sizes described on the previous page and incorporate the same outstanding features as listed at the right. All sizes furnished with ratchet stop or friction thimble, lock nut and 1 inch checking disc. Graduations in thousandths of an inch or hundredths of a millimeter.

Cat. No.	EDP No.	Range	Graduation	Description
2ARL	50027	0 to 2"	.001"	With Ratchet Stop, Lock Nut and 1" Checking Disc
2AFL	50028	0 to 2"	.001"	With Friction Thimble, Lock Nut and 1" Checking Disc
2D	50031	1" Checking Disc only		
		METRIC		
2MARL	50029	0 to 50 mm	0.01 mm	With Ratchet Stop, Lock Nut and 25 mm Checking Disc
2MD	50032	25 mm Checking Disc only		

NOTE: See No. 212 Attachment next page for converting No. 2 series 2 inch micrometers to 0 to 1 inch range—and No. 212M for converting No. 2M series to 0 to 25 mm range.

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

One-Inch and 25mm Attachments For 1 to 2 Inch and 25 to 50mm (Metric) Outside Micrometer Calipers No. 212 and 212M



The No. 212 attachment is easily applied to No. 2 Series micrometers as illustrated at right.

These No. 2 and No. 2M Series useful attachments readily convert Starrett Micrometers listed below to handle measurements from 0 to 1 inch or 0 to 25 mm thereby extending the total range from 0 to 2 inches or 50 mm.

Easily and quickly attached to the anvil of the micrometer, it is only necessary to tighten a locking screw to make the conversion. Anvil extension is hardened, ground and lapped. No-Glare SATIN-CHROME Finish. Fits No. 2 and No. 2M Series Micrometers only.

Cat. No.	EDP No.	Description
212	50735	Attachment for No. 2 Series Micrometers
		METRIC
212M	50736	Attachment for No. 2M Series Micrometers

Packed One in a Box

Ball Attachment For Outside Micrometer Calipers No. 247 Series — English and Metric

Ball attachment is shown in close-up above and also in position on micrometer anvil.

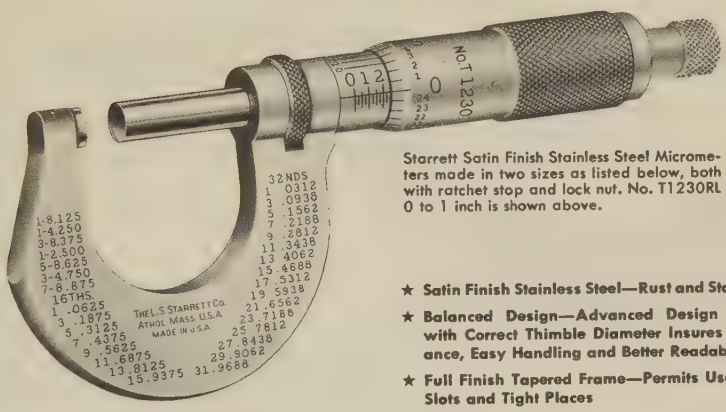
Starrett Micrometers having spindle sizes listed below can be instantly converted for measuring wall thickness of tubing, split and full bearings, sleeves and other parts with rounded surfaces by means of the No. 247 Ball Attachment shown at left.

Easily applied by snapping on to end of either anvil or spindle, thus permitting two attachments to be used together. Balls are hardened, measure .200 inch and 5 mm diameters and move freely in the retainer insuring positive contact with anvil and spindle. *The diameters, .200 inch or 5 mm of each ball used, must be subtracted from the micrometer reading.*

Cat. No.	EDP No.	Description
247A	51174	For No. 2, No. 226 and No. 230 Series Micrometers and No. 263 Series Micrometer Heads, .235" diameter Anvil
247B	51175	For No. 436, 224A and 224AA Series Micrometers, .270" diameter Anvil
247C	51176	For No. 232 Series Micrometers and No. 463 Series Micrometer Heads, .200" diameter Anvil
247D	51177	For Nos. 216, 1212, 1230 Micrometers, .250" diameter Anvil
247E	51178	For Nos. 224B through J, 238, 239, 436 Micrometers and No. 663 Micrometer Heads, .300" diameter Anvil
247MA	51179	For No. 2M and No. 230M Micrometers and No. 263M Micrometer Heads, .235" diameter Anvil
247MB	51180	For No. 436M Micrometers, .270" diameter Anvil
247MD	56691	For Nos. 216M Micrometers, .250" diameter Anvil
247ME	56692	For Nos. 224MB through J, 238M, 436M Micrometers and No. 663M Micrometer heads, .300" diameter Anvil

Packed Six in a Box

ALSO AVAILABLE WITH CARBIDE FACES



Starrett Satin Finish Stainless Steel Micrometers made in two sizes as listed below, both with ratchet stop and lock nut. No. T1230RL 0 to 1 inch is shown above.

Outside Micrometer Calipers

Stainless Steel Throughout

0 to 1 inch and 1 to 2 inch

No. 1212 and No. 1230 Series

FEATURING Satin Finish stainless steel, plus other features listed at right, these Starrett Micrometers are rust and stain resistant. Use of stainless steel for all parts makes them always easy-to-read, smooth working, with extra long life under adverse atmospheric and operating conditions.

The tapered frame permits convenient measurements in narrow slots and tight places. Spindle has rigid, one-piece construction with threads hardened, ground from the solid and stabilized. Micro-lapped finish on ends of anvil and spindle insure more accurate measurements and longer life.

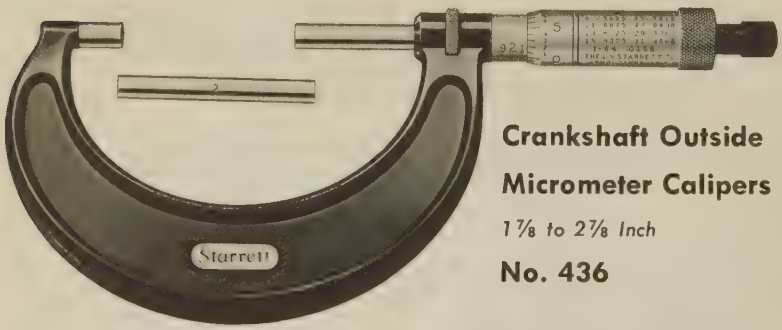
- ★ **Satin Finish Stainless Steel—Rust and Stain Resistant**
- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Full Finish Tapered Frame—Permits Use in Narrow Slots and Tight Places**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces—Also Available with Carbide Faces**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rigid One-Piece Frame—Drop Forged Steel**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents**
- ★ **Quick, Easy Adjustment**
- ★ **Ratchet Stop—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading**

Available in two sizes—0 to 1 inch and 1 to 2 inch—with graduations in thousandths or ten-thousandths of an inch as listed below. All sizes furnished with ratchet stop and lock nut; 2 inch sizes also with 1 inch standard.

Cat. No.	EDP No.	Range	Graduation	Description
1230RL	53186	0 to 1"	.001"	With Ratchet Stop, Lock Nut
T1230RL	53188	0 to 1"	.0001"	With Ratchet Stop, Lock Nut
1212RL	53174	1 to 2"	.001"	With Ratchet Stop, Lock Nut and Standard
T1212RL	53176	1 to 2"	.0001"	With Ratchet Stop, Lock Nut and Standard

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

ALSO AVAILABLE WITH CARBIDE FACES ON SPECIAL ORDER



Crankshaft Outside Micrometer Calipers

1⅞ to 2⅞ Inch

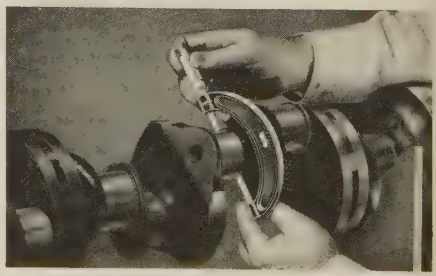
No. 436

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Sturdy, Smooth Black Enameled Frame**
- ★ **SATIN-CHROME Finish on Sleeve and Thimble—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces—Also Available with Carbide Faces**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rigid One-Piece Frame—Drop Forged Steel**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents**
- ★ **Quick, Easy Adjustment**
- ★ **Ratchet Stop—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading**

ALTHOUGH this Starrett SATIN-CHROME Micrometer is designed for automotive work and especially for crankshaft measuring, it is well suited for all other work within its capacity. Measures the diameter of the journal bearing and main bearing of most crankshafts since the micrometer has a 3 inch frame with a range from 1⅞ to 2⅞ inches.

As shown above, the reading point is on the *under side* of the thimble, *plainly visible while measuring*—a very useful feature when measuring between webs. Anvil and spindle lengths are also specially designed for crankshaft measurements.

Other features include smooth black enamel on frame which cleans up easily, No-Glare SATIN-CHROME Finish on reading surfaces and many additional features listed above. Graduated in thousandths of an inch and furnished with ratchet stop, lock nut and standard.

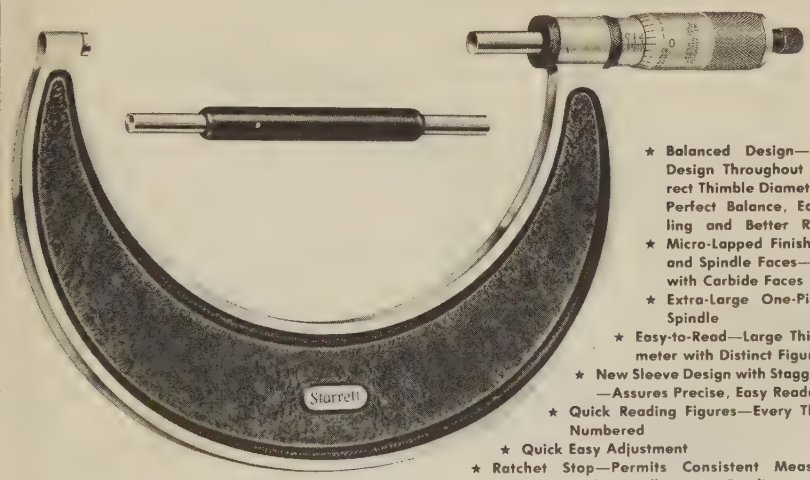


Miking a crankshaft journal. Note that the reading point, the longitudinal line on the sleeve, is on the *under side* of the thimble, *plainly visible while measuring*.

Cat. No.	EDP No.	Range	Graduation	Description
436RLS-2⅞	51562	1⅞ to 2⅞"	.001"	With Ratchet Stop, Lock Nut and Standard
436RL-2⅞	51563	1⅞ to 2⅞"	.001"	With Ratchet Stop, Lock Nut; Without Standard

Also Available With Carbide Measuring Faces –Specify "X" After Catalog Number
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

ALSO AVAILABLE WITH CARBIDE FACES



★ Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability
★ Micro-Lapped Finish on Anvil and Spindle Faces—Available with Carbide Faces
★ Extra-Large One-Piece Rigid Spindle
★ Easy-to-Read—Large Thimble Diameter with Distinct Figures
★ New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability
★ Quick Reading Figures—Every Thousandth Numbered
★ Quick Easy Adjustment
★ Ratchet Stop—Permits Consistent Measurements
Lock Nut—Locks Spindle at Any Reading

Heavy Duty Outside Micrometer Calipers — 1 to 6 Inch
No. 239 Series

When heavy duty micrometers larger than No. 238 micrometers are required (page 27), Starrett No. 239 Satin Chrome Micrometers in sizes from 2 up to 6 inches in steps of 1 inch can also be furnished as listed below. Heavy duty construction featured throughout designed to give lasting precision even with hard usage under unfavorable conditions.

Large, strongly ribbed, drop forged frames are designed for extra rigidity and are finished in black wrinkled finish with polished steel ribs and outside surfaces. The Satin Chrome micrometer head is extra large with oversize anvil and spindle with larger bearing surfaces on threads. Ends of spindle and anvil have micro-lapped finish. Spindle is hardened and threads are ground from the solid and stabilized. Other plus-features listed above.

Furnished with ratchet stop and lock nut and graduations in thousandths of an inch. Standards can also be furnished as listed and are sent with micrometer unless otherwise ordered.

Range	Graduation	With Ratchet Stop, Lock Nut and Standard		With Ratchet Stop and Lock Nut; Without Standard	
		Cat. No.	EDP No.	Cat. No.	EDP No.
1 to 2"	.001"	**239RLS-2**	51086	**239RL-2**	51087
2 to 3"	.001"	**239RLS-3**	51089	**239RL-3**	51090
3 to 4"	.001"	**239RLS-4**	51092	**239RL-4**	51093
4 to 5"	.001"	**239RLS-5**	51095	**239RL-5**	51096
5 to 6"	.001"	**239RLS-6**	51098	**239RL-6**	51099

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Also Available With .0001" Graduations—Specify "T" Before Catalog Number
Available With Attractive, Protective Case—Sent Without Case
And With Standard Unless Otherwise Ordered
Packed One in a Box

Outside Micrometer Calipers

1 to 6 Inch

No. 226 Series

Shown here is the Starrett No. 226RL 2 inch micrometer with ratchet stop and lock nut and graduated in thousandths of an inch. The 1 inch standard shown also available if desired.

The mechanic has a choice of five different Starrett satin chrome micrometers in this series to suit his particular size requirements—either 1 to 2 inch, 2 to 3 inch, 3 to 4 inch, 4 to 5 inch, or 5 to 6 inch sizes. These micrometers feature rugged, substantial construction together with the finest precision workmanship throughout.

Frames are both handsome and practical, being made of forged steel with strongly ribbed construction. Smooth black enamel on the frames and polished steel ribs and outside surfaces make them unusually attractive.

Available with lock nut and with or without ratchet stop or friction thimble. Graduated in thousandths of an inch or ten-thousandths of an inch as listed on next page. Standards can be furnished if desired. Besides being available singly, all micrometers can be purchased as a complete set as described on pages 44, 45.

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Black Enameled Frame with Polished Steel Ribs and Outside Surfaces**
- ★ **SATIN-CHROME Finish on Sleeve and Thimble—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Anvil and Spindle Faces—Also Available with Carbide Faces**
- ★ **One-Piece Extra Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Drop Forged Steel Frame—Ribbed for Extra Strength and Rigidity**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Convenient Decimal Equivalents on 1 inch size**
- ★ **Quick, Easy Adjustment**
- ★ **Ratchet Stop or Friction Thimble—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading.**

(Continued on next page)

Outside Micrometer Calipers

1 to 6 Inch

No. 226 Series

ALSO AVAILABLE WITH CARBIDE FACES

Range	With Ratchet Stop and Lock Nut		With Friction Thimble and Lock Nut		Standard (extra)	
	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
			Graduation—.001"			
1 to 2"	**226RL-2**	50820	**226FL-2**	50821	**234B-1**	51017
2 to 3"	**226RL-3**	50825	**226FL-3**	50826	**234B-2**	51019
3 to 4"	**226RL-4**	50830	**226FL-4**	50831	**234B-3**	51021
4 to 5"	**226RL-5**	50835	**226FL-5**	50836	**234B-4**	51023
5 to 6"	**226RL-6**	50840	**226FL-6**	50841	**234B-5**	51025
			Graduation—.0001"			
1 to 2"	**T226RL-2**	50845	—	—	**234B-1**	51017
2 to 3"	**T226RL-3**	50846	—	—	**234B-2**	51019
3 to 4"	**T226RL-4**	50847	—	—	**234B-3**	51021
4 to 5"	**T226RL-5**	50848	—	—	**234B-4**	51023
5 to 6"	**T226RL-6**	50849	—	—	**234B-5**	51025

RL Models Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Available With Attractive, Protective Case—Sent Without Case, Without Standard And With Ratchet Stop And Lock Nut Unless Otherwise Ordered
Packed One in a Box

Outside Micrometer Calipers

No. 436 Series—*0 to 6 Inch*

No. 436M Series—*0 to 150 mm*

Except for size, No. 436 micrometers up to 6" and 150 mm are similar to No. T436RL-1 (left) with solid, black enamel finish frames. 7-24" and 175-300 mm sizes (pages 38-39) have perforated frames with black wrinkled finish.

Precision performance combined with strength, rigidity, lightness and moderate price. Forged frames, ribbed for extra strength, have black enamel finish and are tapered for use in narrow slots and tight places. Advanced design with correct thimble diameter for perfect balance, easy handling. Satin chrome finish on sleeve and thimble. Staggered lines and distinct figures on sleeve. Quick-reading figures on thimble with every thousandth numbered; convenient decimal equivalents, too. Micro-lapped finish on anvil and spindle faces. One-piece hardened spindle with threads ground from the solid and stabilized.

Range	Graduation	Cat. No.	EDP No.	Standard (Extra)	
				Cat. No.	EDP No.
Without Ratchet Stop, No Lock Nut					
0 to 1"	.001"	**436P-1**	51565	—	—
1 to 2"		**436P-2**	51590	**234B-1**	51017
2 to 3"		**436P-3**	51610	**234B-2**	51019
3 to 4"		**436P-4**	51628	**234B-3**	51021
4 to 5"		**436P-5**	51645	**234B-4**	51023
5 to 6"		**436P-6**	51662	**234B-5**	51025
With Ratchet Stop, No Lock Nut					
0 to 1"	.001"	**436R-1**	51566	—	—
1 to 2"		**436R-2**	51591	**234B-1**	51017
Without Ratchet Stop, With Lock Nut					
0 to 1"	.001"	**436L-1**	51567	—	—
1 to 2"		**436L-2**	51592	**234B-1**	51017
2 to 3"		**436L-3**	51612	**234B-2**	51019
3 to 4"		**436L-4**	51629	**234B-3**	51021
4 to 5"		**436L-5**	51646	**234B-4**	51023
5 to 6"		**436L-6**	51663	**234B-5**	51025

Also Available With Carbide Measuring Faces (except No. 436R, No. 436MR and No. 436L)—Specify "X" After Catalog Number. Attractive, protective cases available at slight extra charge. Sizes 1"-6" Furnished Without Case Unless Otherwise Ordered. Packed One in a Box

(Continued on next page)

Outside Micrometer Calipers

No. 436 Series—*0 to 6 Inch* No. 436M Series—*0 to 150 mm*

continued

Range	Graduation	Cat. No.	EDP No.	Standard (Extra)	
				Cat. No.	EDP No.
With Ratchet Stop and Lock Nut					
0 to 1"	.001"	**436RL-1**	51568	—	—
1 to 2"		**436RL-2**	51593	**234B-1**	51017
2 to 3"		**436RL-3**	51613	**234B-2**	51019
3 to 4"		**436RL-4**	51630	**234B-3**	51021
4 to 5"		**436RL-5**	51647	**234B-4**	51023
5 to 6"		**436RL-6**	51664	**234B-5**	51025
With Friction Thimble, No Lock Nut					
0 to 1"	.001"	**436F-1**	51569	—	—
1 to 2"		**436F-2**	51594	**234B-1**	51017
With Friction Thimble and Lock Nut					
0 to 1"	.001"	**436FL-1**	51570	—	—
1 to 2"		**436FL-2**	51595	**234B-1**	51017
2 to 3"		**436FL-3**	51614	**234B-2**	51019
3 to 4"		**436FL-4**	51631	**234B-3**	51021
4 to 5"		**436FL-5**	51648	**234B-4**	51023
5 to 6"		**436FL-6**	51665	**234B-5**	51025
Without Ratchet Stop, No Lock Nut					
0 to 1"	.0001"	**T436P-1**	51571	—	—
1 to 2"		**T436P-2**	51596	**234B-1**	51017
With Ratchet Stop and Lock Nut					
0 to 1"	.0001"	**T436RL-1**	51572	—	—
1 to 2"		**T436RL-2**	51597	**234B-1**	51017
2 to 3"		**T436RL-3**	51616	**234B-2**	51019
3 to 4"		**T436RL-4**	51633	**234B-3**	51021
4 to 5"		**T436RL-5**	51650	**234B-4**	51023
5 to 6"		**T436RL-6**	51667	**234B-5**	51025
With Friction Thimble and Lock Nut					
0 to 1"	.0001"	**T436FL-1**	51573	—	—
1 to 2"		**T436FL-2**	51598	**234B-1**	51017
2 to 3"		**T436FL-3**	51617	**234B-2**	51019
3 to 4"		**T436FL-4**	51634	**234B-3**	51021
4 to 5"		**T436FL-5**	51651	**234B-4**	51023
5 to 6"		**T436FL-6**	51668	**234B-5**	51025
Without Ratchet Stop, No Lock Nut					
0 to 25 mm	0.01 mm	**436MP-25**	51574	—	—

Also Available With Carbide Measuring Faces (except No. 436R, No. 436MR and No. 436L)—Specify "X" After Catalog Number. Attractive, protective cases available at slight extra charge. Sizes 1"-6" Furnished Without Case Unless Otherwise Ordered. Packed One in a Box

(Continued on next page)

Outside Micrometer Calipers

No. 436 Series—*0 to 6 Inch* No. 436M Series—*0 to 150 mm*

continued

Range	Graduation	Cat. No.	EDP No.	Standard (Extra) Cat. No.	Standard (Extra) EDP No.
With Ratchet Stop, No Lock Nut					
0 to 25 mm	0.01 mm	**436MR-25**	51575	—	—
With Ratchet Stop and Lock Nut					
0 to 25 mm	0.01 mm	**436MRL-25**	51576	—	—
25 to 50 mm		**436MRL-50**	51599	**234MB-25**	51018
50 to 75 mm		**436MRL-75**	51618	**234MB-50**	51020
75 to 100 mm		**436MRL-100**	51635	**234MB-75**	51022
100 to 125 mm		**436MRL-125**	51652	**234MB-100**	51024
125 to 150 mm		**436MRL-150**	51669	**234MB-125**	51026
With Friction Thimble and Lock Nut					
0 to 25 mm	0.01 mm	**436MFL-25**	56105	—	—
25 to 50 mm		**436MFL-50**	56106	**234MB-25**	51018
50 to 75 mm		**436MFL-75**	56107	**234MB-50**	51020
75 to 100 mm		**436MFL-100**	56108	**234MB-75**	51022
100 to 125 mm		**436MFL-125**	56109	**234MB-100**	51024
125 to 150 mm		**436MFL-150**	56110	**234MB-125**	51026
With Ratchet Stop and Lock Nut					
0 to 25 mm	0.002 mm	**V436MRL-25**	51577	—	—
25 to 50 mm		**V436MRL-50**	56307	**234MB-25**	51018
50 to 75 mm		**V436MRL-75**	56308	**234MB-50**	51020
75 to 100 mm		**V436MRL-100**	56309	**234MB-75**	51022
100 to 125 mm		**V436MRL-125**	56310	**234MB-100**	51024
125 to 150 mm		**V436MRL-150**	56311	**234MB-125**	51026

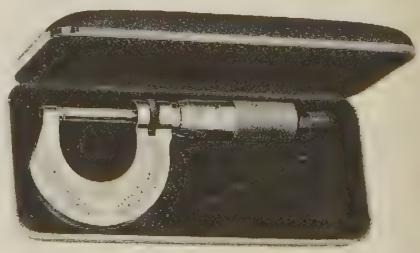
Also Available With Carbide Measuring Faces (except No. 436R, No. 436MR and No. 436L)—Specify "X" After Catalog Number. Attractive, protective cases available at slight extra charge. Sizes 1"-6" Furnished Without Case Unless Otherwise Ordered. Packed One in a Box

Attractive, Protective Cases For 1 and 2 Inch, 25 mm and 50 mm Outside Micrometer Calipers

These attractive, protective cases give complete protection against scratches and damage, and exclude dirt and grit. Rigid, substantial construction.

Cat. No.	EDP No.	Description
910	55397	Case for 1" Micrometers—No. 204, 210, 211, 221, 230, 256, 436, 575, 577, 1230
912	55399	Case for 2" Micrometers—No. 2, 2A, 585, 1212
913	55400	Case for 2" Micrometers—No. 226, 256, 436, 486—1"

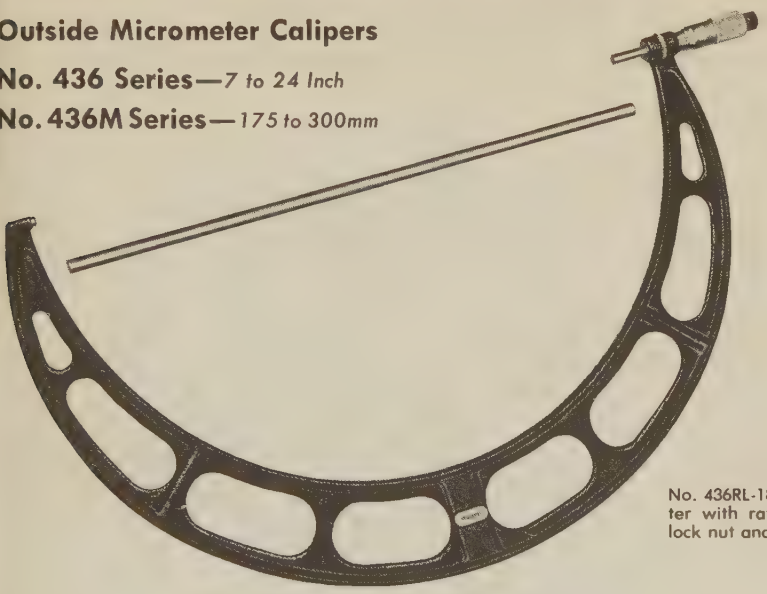
Packed One in a Box



Outside Micrometer Calipers

No. 436 Series—*7 to 24 Inch*

No. 436M Series—*175 to 300mm*



No. 436RL-18 Micrometer with ratchet stop, lock nut and standard.

These micrometers have no-glare satin chrome finish on sleeves and thimbles and black wrinkled finish on frames which are perforated for lightness. Thimbles are large, well balanced, and have quick-reading figures with every thousandth numbered. .300" diameter anvils and spindles have micro-lapped measuring faces. One piece spindles are hardened with threads ground from the solid and stabilized. No. 436 micrometers are also available in sets as listed on pages 44, 45.

ALSO SEE PAGES 36-38 FOR No. 436 1 to 6" and 25 to 150 mm MICROMETERS WITH SOLID, BLACK ENAMEL FRAMES.

Range	Graduation	In Case		Without Case		Standard (Extra)	
		Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
With Ratchet Stop and Lock Nut							
6 to 7"	.001"	**436RLZ-7**	51683	**436RL-7**	51684	**234B-6**	51027
7 to 8"		**436RLZ-8**	51711	**436RL-8**	51712	**234B-7**	51029
8 to 9"		**436RLZ-9**	51739	**436RL-9**	51740	**234B-8**	51031
9 to 10"		**436RLZ-10**	51767	**436RL-10**	51768	**234B-9**	51033
10 to 11"		**436RLZ-11**	51795	**436RL-11**	51796	**234B-10**	51035
11 to 12"		**436RLZ-12**	51823	**436RL-12**	51824	**234B-11**	51037

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number. Attractive, protective cases available at slight additional charge; 13"-24" Sizes Furnished in Cases at No Extra Charge. Sizes 7"-12" Furnished in Case Unless Otherwise Ordered. Packed One in a Box

(Continued on next page)

Outside Micrometer Calipers

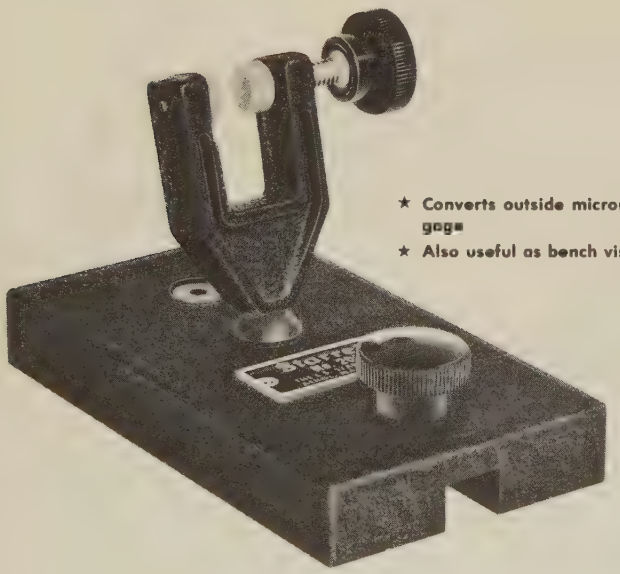
No. 436 Series—*7 to 24 Inch* **No. 436M Series**—*175 to 300 mm*

continued

Range	Graduation	In Case		Without Case		Standard (Extra)	
		Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
With Ratchet Stop and Lock Nut							
12 to 13"	.001"	**436RLZ-13**	51847	—	—	**234B-12**	51039
13 to 14"		**436RLZ-14**	51849	—	—	**234B-13**	51041
14 to 15"		**436RLZ-15**	51851	—	—	**234B-14**	51043
15 to 16"		**436RLZ-16**	51853	—	—	**234B-15**	51045
16 to 17"		**436RLZ-17**	51855	—	—	**234B-16**	51047
17 to 18"		**436RLZ-18**	51857	—	—	**234B-17**	51049
18 to 19"		**436RLZ-19**	51859	—	—	**234B-18**	51051
19 to 20"		**436RLZ-20**	51861	—	—	**234B-19**	51053
20 to 21"		**436RLZ-21**	51863	—	—	**234B-20**	51055
21 to 22"		**436RLZ-22**	51865	—	—	**234B-21**	51057
22 to 23"		**436RLZ-23**	51867	—	—	**234B-22**	51059
23 to 24"		**436RLZ-24**	51869	—	—	**234B-23**	51061
6 to 7"	.0001"	**T436RLZ-7**	51687	**T436RL-7**	51688	**234B-6**	51027
7 to 8"		**T436RLZ-8**	51715	**T436RL-8**	51716	**234B-7**	51029
8 to 9"		**T436RLZ-9**	51743	**T436RL-9**	51744	**234B-8**	51031
9 to 10"		**T436RLZ-10**	51771	**T436RL-10**	51772	**234B-9**	51033
10 to 11"		**T436RLZ-11**	51799	**T436RL-11**	51800	**234B-10**	51035
11 to 12"		**T436RLZ-12**	51827	**T436RL-12**	51828	**234B-11**	51037
150 to 175 mm	0.01 mm	**436MRLZ-175**	51691	**436MRL-175**	51692	**234MB-150**	51028
175 to 200 mm		**436MRLZ-200**	51719	**436MRL-200**	51720	**234MB-175**	51030
200 to 225 mm		**436MRLZ-225**	51747	**436MRL-225**	51748	**234MB-200**	51032
225 to 250 mm		**436MRLZ-250**	51775	**436MRL-250**	51776	**234MB-225**	51034
250 to 275 mm		**436MRLZ-275**	51803	**436MRL-275**	51804	**234MB-250**	51036
275 to 300 mm		**436MRLZ-300**	51831	**436MRL-300**	51832	**234MB-275**	51038
With Friction Thimble and Lock Nut							
6 to 7"	.001"	**436FLZ-7**	51685	**436FL-7**	51686	**234B-6**	51027
7 to 8"		**436FLZ-8**	51713	**436FL-8**	51714	**234B-7**	51029
8 to 9"		**436FLZ-9**	51741	**436FL-9**	51742	**234B-8**	51031
9 to 10"		**436FLZ-10**	51769	**436FL-10**	51770	**234B-9**	51033
10 to 11"		**436FLZ-11**	51797	**436FL-11**	51798	**234B-10**	51035
11 to 12"		**436FLZ-12**	51825	**436FL-12**	51826	**234B-11**	51037
6 to 7"	.0001"	**T436FLZ-7**	51689	**T436FL-7**	51690	**234B-6**	51027
7 to 8"		**T436FLZ-8**	51717	**T436FL-8**	51718	**234B-7**	51029
8 to 9"		**T436FLZ-9**	51745	**T436FL-9**	51746	**234B-8**	51031
9 to 10"		**T436FLZ-10**	51773	**T436FL-10**	51774	**234B-9**	51033
10 to 11"		**T436FLZ-11**	51801	**T436FL-11**	51802	**234B-10**	51035
11 to 12"		**T436FLZ-12**	51829	**T436FL-12**	51830	**234B-11**	51037

Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number. Attractive, protective cases available at slight additional charge; 13"-24" Sizes Furnished in Cases at No Extra Charge. Sizes 7"-12" Furnished in Case Unless Otherwise Ordered. Packed One in a Box

Micrometer Stand
No. 206



★ Converts outside micrometer to sturdy bench gage

★ Also useful as bench vise or assembly fixture

This rugged stand turns an outside micrometer into a handy bench gage for batch inspection of small parts; for checking work where repeated reference is made to a given dimension; and for scores of other gaging applications where it is more convenient to bring the work to the micrometer instead of the micrometer to the work. It also serves as a handy bench vise or holding fixture in alignment and assembly work.

The micrometer frame is gripped firmly in a tilting head between two nylon pads tightened by a knurled thumb screw. Ball joint construction allows the tilting head to be positioned as much as 45° off perpendicular in any direction, and a positive locking device secures it in position when a knurled thumb screw on the base is turned. The base, 5-3/8" long x 3" wide x 3/4" thick, and the tilting bracket, 3/8" clamping capacity x 1" throat depth, are both cast iron with black wrinkle finish. The replaceable nylon pads in the tilting bracket are 15/32" diameter x 3/16" thick.

Cat. No.	EDP No.	Clamping Capacity*	Overall Dimensions Length	Width	Height
206	55794	3/8"	5-3/8"	3"	3-3/8"

*Accommodates all Starrett 1/2" and 1" outside micrometers; Nos. 2 and 2A 2" outside micrometers; and Nos. 210, 220, 483, 485 and 569 special purpose micrometers.

Packed One in a Box

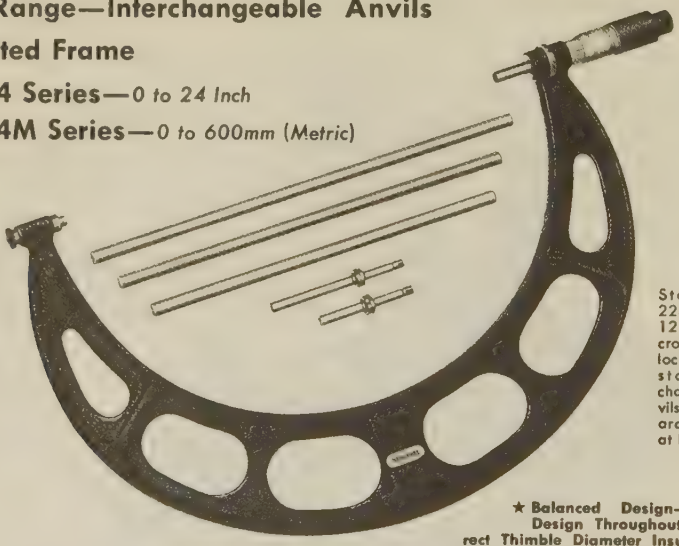
Outside Micrometer Calipers

Wide Range—Interchangeable Anvils

Perforated Frame

No. 224 Series—*0 to 24 Inch*

No. 224M Series—*0 to 600mm (Metric)*



Starrett No. 224C-RL 9 to 12 inch Micrometer with lock nut, ratchet stop, interchangeable anvils and standards is shown at left.

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Perforated Frame—Interchangeable Anvils—Frames up to 6 inches (and 150 mm) Finished in Smooth Black Enamel; Larger Sizes Have Wrinkled Finish**
- ★ **SATIN-CHROME Finish on Sleeve and Thimble—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Spindle Face—Anvil Faces Lapped**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Rugged Steel Frame—Ribbed for Extra Strength and Rigidity**
- ★ **Easy-to-Read—Large Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Quick Easy Adjustment**
- ★ **Ratchet Stop or Friction Thimble—Permits Consistent Measurements. Lock Nut—Locks Spindle at Any Reading.** Also see page 9.

Unusual flexibility plus wide range of measurement makes the Starrett No. 224 series SATIN-CHROME Micrometers very popular in machine shops, automotive repair shops and for all other applications requiring a versatile micrometer for diversified gaging work. Sizes range from the 0–4 inch micrometer up to the 20–24 inch size. Metric, 0–100 mm to 500–600 mm.

Each micrometer is equipped with a series of easily interchangeable anvils thus providing the full range in steps of one inch with a single micrometer. Each anvil is fitted with an adjusting collar which compensates for wear and acts as a seat when clamped in position by a locking collar. Suitable wrenches are furnished to make necessary adjustments.

These micrometers have a strong, light frame—ribbed for strength and perforated for lightness—plus No-Glare SATIN-CHROME Finish on sleeve and thimble, hardened spindle with threads ground from the solid and stabilized and other features as listed at right. On sizes 6″–9″ and larger, the micrometer head is large and well balanced with .300″ diameter anvil and spindle and with larger bearing surfaces on threads. Up to 6 inches, frames are finished in smooth black enamel; larger sizes have wrinkled finish. Furnished with interchangeable anvils, lock nut, and with ratchet stop or friction thimble. Graduations are in thousandths of an inch. Standards furnished on all sizes.

(Continued on next page)

Outside Micrometer Calipers

Wide Range—Interchangeable Anvils—Perforated Frame

No. 224 Series—*0 to 24 Inch*

No. 224M Series—*0 to 600mm (Metric)*

continued

Range	Graduation	With Ratchet Stop Lock Nut and Case		Standards (furnished)
		Cat. No.	EDP No.	
0 to 4"	.001"	224AARLZ	50770	1, 2, 3"
2 to 6"		224ARLZ	50772	2, 3, 4, 5"
6 to 9"		224BRLZ	50774	6, 7, 8"
6 to 12"		224GRLZ	50776	6, 7, 8, 9, 10, 11"
9 to 12"		224CRLZ	50778	9, 10, 11"
12 to 16"		224DRLZ	50780	12, 13, 14, 15"
16 to 20"		224ERLZ	50782	16, 17, 18, 19"
20 to 24"		224JRLZ	50784	20, 21, 22, 23"
0 to 100 mm	0.01 mm	224MAARLZ	50771	25, 50, 75 mm
50 to 150 mm		224MARLZ	50773	50, 75, 100, 125 mm
150 to 225 mm		224MBRLZ	50775	150, 175, 200 mm
150 to 300 mm		224MGRLZ	50777	150, 175, 200, 225, 250, 275 mm
225 to 300 mm		224MCRLZ	50779	225, 250, 275 mm
300 to 400 mm		224MDRLZ	50781	300, 325, 350, 375 mm
400 to 500 mm		224MERLZ	50783	400, 425, 450, 475 mm
500 to 600 mm		224MJRLZ	50785	500, 525, 550, 575 mm

Furnished in Attractive, Protective Case—Sent With Standards Unless Otherwise Ordered
Also Available With Friction Thimble In Place of Ratchet Stop—Specify "F" After Catalog Number
Packed One in a Box

Cases for Outside Micrometer Calipers 3 Inch or 75 mm and Larger

Cases to store and protect large size Starrett micrometers are made to the same high standard of workmanship as the tools they contain. Recesses hold not only the micrometer, but also its matching standard plus an adjusting wrench. Available with most micrometers—see individual micrometer listings and separate price book for information.

NOTE: similar attractive, protective cases are provided for micrometers purchased in sets. See page 44.

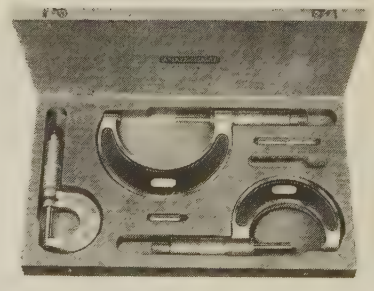
Outside Micrometer Caliper Sets with Attractive, Protective Cases

No. S226 Series—*0 to 6 Inch* **No. S436 Series**—*0 to 24 Inch*

No. S436M Series—*0 to 300 mm*

No. S436K Micrometer Set With Range 0 to 24 Inches Also Available

Box-Type Cases Available To Hold Micrometer Sets 0 to 6", 6 to 12", 0 to 12" or 0 to 24" Range, Having 6, 12 or 24 Micrometers.



Flat-Type Cases Available To Hold Micrometer Sets 0 to 3" or 0 to 4" Range, Having 3 or 4 Micrometers.

Recommended for mechanics, automotive service and machine shops, toolrooms, inspection departments and wherever gaging involves a wide range of measurements. All sets come with attractive, protective cases which keep micrometers and standards together, readily accessible. For further information on each type of micrometer, refer to its listing elsewhere in this catalog. See numerical index for guidance.

Range	No. Micrometers in Set	With Standards With Case		Without Standards With Case		Set of Standards	
		Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
Graduation—.001" Without Ratchet Stop, No Lock Nut							
0 to 3"	Three—1, 2, 3"	**S436APSZ**	51883	**S436APZ**	51884	**S234C**	50852
0 to 6"	Six—1, 2, 3, 4, 5, 6"	**S436CPSZ**	51903	**S436CPZ**	51904	**S234E**	50860

(Continued on next page)

Outside Micrometer Caliper Sets with Attractive, Protective Cases

No. S226 Series—*0 to 6 Inch* No. S436 Series—*0 to 24 Inch*

No. S436M Series—*0 to 300 mm*

continued

Range	No. Micrometers in Set	With Standards With Case		Without Standards With Case		Set of Standards	
		Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
	Graduation—.001" With Ratchet Stop and Lock Nut						
0 to 3"	Three—1, 2, 3"	**S436ARLSZ**	51887	**S436ARLZ**	51888	**S234C**	50852
0 to 4"	Four—1, 2, 3, 4"	**S436BRLSZ**	51895	**S436BRLZ**	51896	**S234D**	51897
0 to 6"	Six—1, 2, 3, 4, 5, 6"	**S436CRLSZ**	51907	**S436CRLZ**	51908	**S234E**	50860
6 to 12"	Six—7, 8, 9, 10, 11, 12"	**S436DRLSZ**	51919	**S436DRLZ**	51920	**S234F**	51917
0 to 12"	Twelve—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12"	**S436ERLSZ**	51931	**S436ERLZ**	51932	**S234G**	51929
0 to 24"	Twenty-four—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24"	**S436KRLSZ**	51953	**S436KRLZ**	51954	**S234H**	51955
0 to 3"	Three—1, 2, 3"	**S226ARLSZ**	50854	**S226ARLZ**	50855	**S234C**	50852
0 to 6"	Six—1, 2, 3, 4, 5, 6"	**S226BRLSZ**	50862	**S226BRLZ**	50863	**S234E**	50860
	Graduation—0.01 mm With Ratchet Stop and Lock Nut						
0 to 75 mm	Three—25, 50, 75 mm	**S436MARLSZ**	51891	**S436MARLZ**	51892	**S234MC**	51893
0 to 100 mm	Four—25, 50, 75, 100 mm	**S436MBRLSZ**	51899	**S436MBRLZ**	51900	**S234MD**	51901
0 to 150 mm	Six—25, 50, 75, 100 125, 150 mm	**S436MCRLSZ**	51911	**S436MCRLZ**	51912	**S234ME**	51913
150 to 300 mm	Six—175, 200, 225, 250, 275, 300 mm	**S436MDRLSZ**	51923	**S436MDRLZ**	51924	**S234MF**	51925
0 to 300 mm	Twelve—25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300 mm	**S436MERLSZ**	51935	**S436MERLZ**	51936	**S234MG**	51937

NOTE: All sets furnished with case, with or without standards. Sent with case and with standards unless otherwise ordered. To prevent damage in transit, micrometers are packed separately.

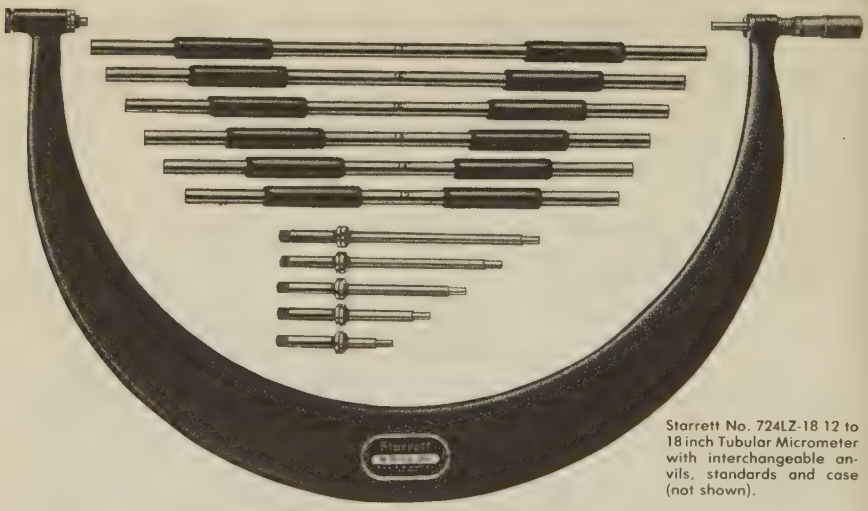
NOTE: Case for No. S436KRL sets measures 3'6" x 15" x 19" approximately.

NOTE: 1" micrometer in No. S226 sets is our No. 230RL.

NOTE: No. S226 and Nos. S436AP, ARL, BRL, CP, CRL, DRL, ERL sets also available graduated in ten-thousandths of an inch if specified.

NOTE: Most sets also available with friction thimble micrometers if specified.

NOTE: Nos. S226 and S436 sets also available with tungsten carbide measuring faces. Specify "X" after catalog number.



Starrett No. 724LZ-18 12 to 18 inch Tubular Micrometer with interchangeable anvils, standards and case (not shown).

Outside Micrometer Calipers
Tubular "C" or Bow Type—Interchangeable Anvils
No. 724L Series—*12 to 60 Inch*

MADE for easier, faster precision measuring of large outside dimensions, these Starrett SATIN-CHROME Micrometers not only have an extended range of 12 up to 60 inches, but at the same time provide perfect balance, highly sensitive feel, ease of handling, and less measuring effort due to their advanced tubular design. Available in eight different sizes in increments of 6 inches.

Frames are built of special analysis steel, formed to exacting tubular design specifications and welded by a carefully controlled process—thus producing a hollow tubular frame combining lightest possible weight with extreme rigidity and standard co-efficient of expansion.

Being furnished with interchangeable anvils, Starrett No. 724 Micrometers are particularly suited for diversified gaging and provide a wide range of measurement in steps of one inch in a single micrometer. Each anvil is fitted with an adjusting collar which compensates for wear and acts as a seat when clamped in position by a locking collar. Adjusting wrenches furnished.

The micrometer head is large and well balanced with .300″ diameter anvil and spindle and with larger bearing surfaces on threads. Furnished with interchangeable anvils, lock nut and standards. Graduations in thousandths of an inch (also in Metric).

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Tubular Frame with Black Wrinkle Finish**
- ★ **Interchangeable Anvils—Wide Range of Measurement for Diversified Gaging**
- ★ **SATIN-CHROME Finish on Sleeve and Thimble—No Glare, Resists Rust**
- ★ **Micro-Lapped Finish on Spindle Face—Anvil Faces Lapped**
- ★ **One-Piece Extra-Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **Hollow Tubular Steel Frame—Provides Lightness plus Extreme Rigidity for Perfect Balance, Feel and Ease of Handling**
- ★ **Easy-to-Read—Large Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Quick Easy Adjustment**
- ★ **Lock Nut—Locks Spindle at Any Reading**

Outside Micrometer Calipers
Tubular "C" or Bow Type—Interchangeable Anvils
No. 724 Series—*12 to 60 Inch*
continued

Range	Graduation	Without Ratchet Stop, With Lock Nut, in Case		Standards (Furnished)
		Cat. No.	EDP No.	
12 to 18"	.001"	724LZ-18	52994	12, 13, 14, 15, 16, 17"
18 to 24"		724LZ-24	52995	18, 19, 20, 21, 22, 23"
24 to 30"		724LZ-30	52996	25, 27, 29"
30 to 36"		724LZ-36	52997	31, 33, 35"
36 to 42"		724LZ-42	52998	37, 39, 41"
42 to 48"		724LZ-48	52999	43, 45, 47"
48 to 54"		724LZ-54	53000	49, 51, 53"
54 to 60"		724LZ-60	53001	55, 57, 59"

ALSO AVAILABLE IN METRIC

NOTE: Larger sizes also available on special order.
NOTE: We do not recommend ten-thousandth readings on these micrometers. Sent with standards unless otherwise ordered. (Standards are solid type with insulated handles up to 35" inclusive. Longer standards are tubular type with insulated handles.)

Also Available With Carbide Measuring Faces on Special Order—Specify "X" After Catalog Number
Furnished Without Ratchet Stop Unless Otherwise Ordered. Ratchet Stops, However, Can Be Furnished When So Desired

Furnished in Attractive, Protective Case
Packed One in a Box

Outside Micrometer Calipers—Tubular "C" or Bow Type—Fixed Anvil

12 to 30 Inch

No. 736L Series

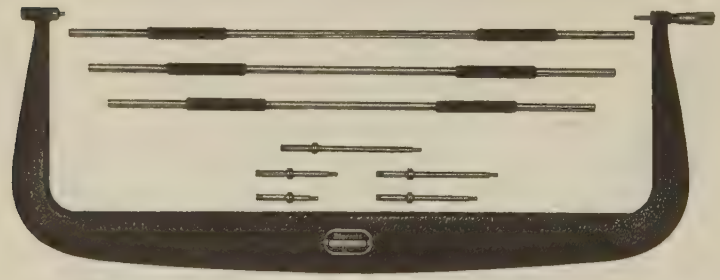
Starrett No. 736L SATIN-CHROME Micrometers are especially suited for repeated measurements on large work and are available in eighteen sizes with overall capacity from 12 up to 30 inches in steps of 1 inch.

These micrometers are equipped with a fixed anvil and all other features are identical with the No. 724 series—including lightweight, extra-rigid tubular steel frames, No-Glare SATIN-CHROME Finish on sleeve and thimble, one-piece spindle, hardened threads ground from the solid, micro-lapped faces on anvil and spindle, etc.

Furnished with fixed anvil, lock nut and standard. Graduations in thousandths of an inch (also available in Metric). Prices on application.

Outside Micrometer Calipers, Tubular Bar or "U" Type Interchangeable Anvils, No. 725L Series

12 to 60 Inch—9½" Maximum Frame Depth, All Sizes



THESE Starrett SATIN-CHROME Micrometers with their tubular bar or "U" frames can be used to good advantage for precision measurement of large work where clearance space is limited. Available in sizes from 12 inch up to 60 inch range with interchangeable anvils. Also available with fixed anvil; prices on application.

No. 725 micrometers have light-weight, extra-rigid tubular frames plus all the other outstanding features of the No. 724 series. Furnished with lock nut and standard. Graduations in thousandths of an inch (also available in Metric).

Range	Graduation	Without Ratchet Stop, With Lock Nut, in Case		Standards (Furnished)
		Cat. No.	EDP No.	
12 to 18"	.001"	725LZ-18	53012	12, 13, 14, 15, 16, 17"
18 to 24"		725LZ-24	53013	18, 19, 20, 21, 22, 23"
24 to 30"		725LZ-30	53014	25, 27, 29"
30 to 36"		725LZ-36	53015	31, 33, 35"
36 to 42"		725LZ-42	53016	37, 39, 41"
42 to 48"		725LZ-48	53017	43, 45, 47"
48 to 54"		725LZ-54	53018	49, 51, 53"
54 to 60"		725LZ-60	53019	55, 57, 59"

ALSO AVAILABLE IN METRIC

NOTE: Larger sizes also available on special order.

NOTE: We do not recommend ten-thousandth readings on these micrometers. Sent with standards unless otherwise ordered. (Standards are solid type with insulated handles up to 35" inclusive. Longer standards are tubular type with insulated handles.)

NOTE: No. 725L Micrometers also available with fixed anvil. Prices on application.

Also Available With Carbide Measuring Faces on Special Order—Specify "X" After Catalog Number

Furnished Without Ratchet Stop Unless Otherwise Ordered. Ratchet Stops, However, Can Be Furnished When So Desired

Furnished in Attractive, Protective Case

Packed One in a Box

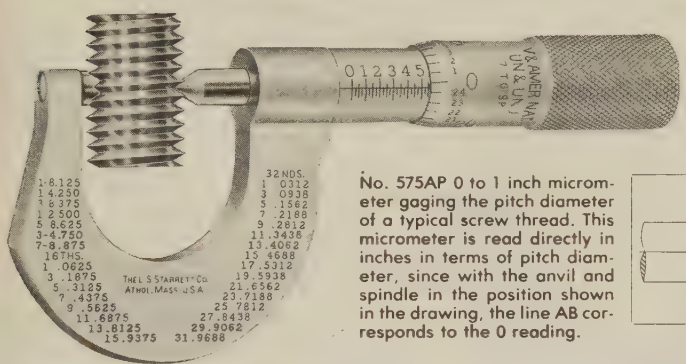
Special Measuring Contacts Available

STARRETT Tubular Micrometers can be furnished with many different combinations of Dial Indicators and Special Measuring Contacts to handle special measuring problems in connection with any job. A typical application is shown in the close-up at the left. Our Special Order Department will be glad to consider your requirements and submit recommendations.

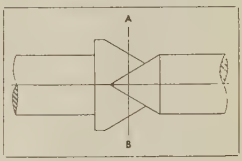
Screw Thread Micrometer Calipers For Measuring Pitch Diameter

Nos. 575 and 585 Series—*0 to 1 Inch and 1 to 2 Inch*

Nos. 575M and 585M Series—*0 to 25 mm and 25 to 50 mm (Metric)*



No. 575AP 0 to 1 inch micrometer gaging the pitch diameter of a typical screw thread. This micrometer is read directly in inches in terms of pitch diameter, since with the anvil and spindle in the position shown in the drawing, the line AB corresponds to the 0 reading.



These micrometers have a pointed spindle and a double V-anvil, both shaped to contact the screw thread as shown in the drawing. The micrometer reading therefore gives the true pitch diameter which equals the outside diameter of the screw minus the depth of one thread. Frames are rigid, one-piece drop forged steel with no-glare satin chrome finish all over. One piece hardened spindle with threads ground from the solid. Furnished with fixed (non-rotating) anvil and without ratchet stop or lock nut.

Series 575 and 585—English

For measuring V, American National, Unified and Unified J series screw threads. Series 585 micrometers come with a one-inch standard at no extra cost.

Cat. No.	EDP No.	Capacity, Pitch Diameter	Range, Threads Per Inch
Graduation—.001"			
575AP	56159	0 to 1"	7-9
575BP	56160	0 to 1"	10-13
575CP	56161	0 to 1"	14-18
575DP	56162	0 to 1"	20-24
575EP	56163	0 to 1"	28-30
575FP	56164	0 to 1"	32-40
585AP	56165	1 to 2"	4½-6
585BP	56166	1 to 2"	7-9
585CP	56167	1 to 2"	10-13
585DP	56168	1 to 2"	14-18
585EP	56169	1 to 2"	20-24
585FP	56170	1 to 2"	28-30

Series 575M and 585M—Metric

For measuring I.S.O. metric screw threads. Series 585M micrometers come with a 25 mm standard at no extra cost.

Cat. No.	EDP No.	Capacity, Pitch Diameter	Range, Pitch in mm
Graduation—0.01 mm			
575MAP	56321	0 to 25 mm	3-4
575MBP	56322	0 to 25 mm	2-2.5
575MCP	56323	0 to 25 mm	1.25-1.75
575MDP	56324	0 to 25 mm	0.75-1
575MEP	56325	0 to 25 mm	0.5-0.7
575MFP	56326	0 to 25 mm	0.35-0.45
585MAP	56327	25 to 50 mm	4.5-6
585MBP	56328	25 to 50 mm	3-4
585MCP	56329	25 to 50 mm	2-2.5
585MDP	56330	25 to 50 mm	1.25-1.75

NOTE: available on special order with swivel anvil . . . also in capacities over 2".

NOTE: see reference tables, back of catalog for pitch diameters and other screw thread data.

Available with Attractive, Protective Case; Sent without Case Unless Otherwise Ordered

Packed One in a Box

Screw Thread Comparator Micrometer Caliper

0 to 7/8 Inch

No. 210 Series

- ★ **Balanced Design—Advanced Design Throughout with Correct Thimble Diameter Insures Perfect Balance, Easy Handling and Better Readability**
- ★ **Smooth Black Enameled Tapered Frame**
- ★ **Conical Anvil and Spindle**
- ★ **Permits Quick Comparison of Threads and Measuring Small Grooves, Recesses**
- ★ **SATIN-CHROME Finish on Sleeve and Thimble—No Glare, Resists Rust**
- ★ **One-Piece Extra Rigid Spindle**
- ★ **Hardened Threads—Ground from the Solid and Stabilized**
- ★ **One-Piece Drop Forged Steel Frame—Ribbed for Extra Rigidity**
- ★ **Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Reading Figures—Every Thousandth Numbered; Convenient Decimal Equivalents**
- ★ **Quick Easy Adjustment**
- ★ **Precision Made Throughout for Lasting Accuracy**

THE Starrett No. 210 SATIN-CHROME Screw Thread Comparator Micrometer is a very useful precision tool for all inspectors and mechanics. Especially desirable for quick comparisons of thread accuracy in screw cutting operations, for measuring in small grooves or recesses where regular micrometers cannot be used, and for many other applications. **(Will not measure pitch diameter; for such measurements, Starrett No. 575 or No. 585 recommended.)**

The No. 210 has conical anvil and spindle faces with 1/64 inch flats on the ends of the points. Adjustment is at zero when the points are in contact. Range is from 0 to 7/8 inches in thousandths of an inch.

Frame is one-piece drop forged steel construction, ribbed for rigidity and finished in smooth black enamel. Sleeve and thimble have No-Glare SATIN-CHROME Finish. Spindle is one-piece with threads hardened, ground from the solid and stabilized. Quick Reading graduations and convenient decimal equivalents are added plus features.

Cat. No.	EDP No.	Range	Graduation	Description
210AP	50731	0 to 7/8"	.001"	Without Ratchet Stop, No Lock Nut

NOTE: Also Available in Larger Sizes On Special Order

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered

Packed One in a Box

ALSO AVAILABLE WITH CARBIDE FACES

Steel Mill Outside Micrometer Caliper No. 205—*0 to 1 Inch*

- ★ **Specially Designed for Gaging Hot Metals**
- ★ **SATIN-CHROME Finish—No-Glare, Resists Rust**
- ★ **Heavy Duty One-Piece Spindle with Hardened Threads Ground from the Solid**
- ★ **Spindle and Anvil Beveled To Easily Slide Onto Work**
- ★ **Easy-to-Read—Extra Long Bevel on Thimble with Heavy Cut Graduations**
- ★ **New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability**
- ★ **Quick Easy Adjustment by Anvil Lock Screw or Friction Sleeve**
- ★ **Reversible Wing Head Lock Nut—Easy to Lock or Release with Heavy Gloves**

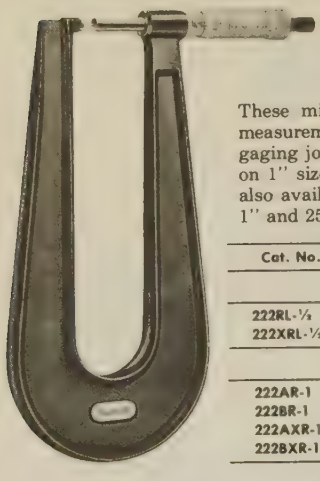
THE Starrett No. 205 SATIN-CHROME Steel Mill Micrometer is specially designed for gaging hot metal sheet in steel mills and has many features for safer, faster and more accurate measurements. Consisting of a micrometer having rugged construction throughout to which is attached a convenient wooden handle correctly shaped for a firm grip, the No. 205 Steel Mill Micrometer can be comfortably held with the hand at a safe distance from the hot metal. Also available without handle. Setting for any measurement is maintained by means of a wing head lock nut which is easy to lock or release even using heavy gloves. Lock nut is reversible. Range—0 to 1 inch.

No-Glare SATIN-CHROME Finish makes markings stand out sharp, clear and easy to read under any illumination—in dim light or bright sunlight—and gives high resistance to stains and corrosion. Another feature is the extra long bevel on the thimble with heavy-cut graduations in thousandths of an inch. Convenient decimal equivalents are stamped on the frame.

The heavy duty spindle is .270" diameter and has one piece construction. Threads are hardened, stabilized and ground from the solid for lasting precision. Both spindle and anvil are beveled to easily slide onto the work. This micrometer can be quickly adjusted by the anvil lock screw or by simple sleeve adjustment.

Cat. No.	EDP No.	Range	Graduation	Description
205P	50727	0 to 1"	.001"	Without Lock Nut, Without Handle
205HP	50728	0 to 1"	.001"	Without Lock Nut, With Handle
205L	50729	0 to 1"	.001"	With Lock Nut, Without Handle
205HL	50730	0 to 1"	.001"	With Lock Nut, With Handle

No. 205P without Lock Nut, without Handle Sent Unless Otherwise Ordered
Also Available With Carbide Measuring Faces—Specify "X" After Catalog Number
Packed One in a Box



No. 222R—range 1 inch, throat depth 6 inches

Sheet Metal Micrometer Caliper

No. 222 Series—*0 to 1 Inch*

No. 222M Series—*0 to 25 mm (Metric)*

These micrometers reach over the edge of sheet metal and take measurements away from the edge toward the center. Also for other gaging jobs where a deep throat micrometer is needed. Rounded anvil on 1" size gives a point contact for more accurate gaging; flat anvil also available. 1/2" and 13 mm micrometers have full finish frames; 1" and 25 mm micrometer frames have black wrinkle finish.

Cat. No.	EDP No.	Anvil	Description
2" Throat Depth; 0 to ½" Range; .001" Graduation			
222RL-½	50756	Flat	With Ratchet Stop and Lock Nut
222XRL-½*	50757	Flat	With Ratchet Stop and Lock Nut
6" Throat Depth; 0 to 1" Range; .001" Graduation			
222AR-1	50761	Rounded	With Ratchet Stop, No Lock Nut
222BR-1	50760	Flat	With Ratchet Stop, No Lock Nut
222AXR-1*	50762	Rounded	With Ratchet Stop, No Lock Nut
222BXR-1*	50763	Flat	With Ratchet Stop, No Lock Nut
50 mm Throat Depth; 0 to 13 mm Range; 0.01 mm Graduation			
222MRL-13	50758	Flat	With Ratchet Stop and Lock Nut
150 mm Throat Depth; 0 to 25 mm Range; 0.01 mm Graduation			
222MAR-25	50764	Rounded	With Ratchet Stop, No Lock Nut
222MBR-25	50765	Flat	With Ratchet Stop, No Lock Nut

*Tungsten Carbide Measuring Faces
NOTE: 0-1" range and 0-25 mm range micrometers sent with rounded anvil unless otherwise ordered.
Available With Attractive Protective Case—Sent Without Case Unless Otherwise Ordered—Packed One in a Box

Tube Micrometer Calipers

No. 569 Series—*0 to 1 Inch*

No. 569M Series—*0 to 25 mm (Metric)*

For measuring the wall thickness of tubing and other parts with cylindrical walls. Also for measuring from a hole to an edge (note minimum hole sizes in table). One-piece drop forged "half" frame with smooth black enamel finish. Extended anvil positioned at right angles to the spindle. SATIN CHROME finish on sleeve and thimble.

Cat. No.	EDP No.	Range	Graduation	Minimum Hole Size	Description
569AP	52593	0 to 1"	.001"	3/16"	Without Ratchet Stop, No Lock Nut
569BP	52595	0 to 1"	.001"	3/8"	Without Ratchet Stop, No Lock Nut
569MAP	52594	0 to 25 mm	0.01 mm	4.8 mm	Without Ratchet Stop, No Lock Nut
569MBP	52596	0 to 25 mm	0.01 mm	9.5 mm	Without Ratchet Stop, No Lock Nut

Special Anvils Also Can Be Furnished—Prices on Application
Available With Attractive, Protective Case
Sent Without Case Unless Otherwise Ordered
Packed One in a Box

Starrett No. 576R Micrometer; Range 0 to ½ inch; Full Finish Frame.

Starrett No. 211P Micrometer; Range 0 to 1 inch; Black Enamel Frame.

Starrett No. 577P Micrometer; Range 0 to 1 inch; Full Finish Frame.

Outside Micrometer Calipers with Rounded Anvil

0 to ½ Inch and 0 to 1 Inch—English

0 to 13mm and 0 to 25mm—Metric

THESE three Starrett SATIN-CHROME Micrometers are all extremely useful for measuring the wall thickness of all parts such as solid and split bearings, tubing, sleeves, collars, rings, various cylinders, and also for measuring from the inside of a hole to an edge. All three have a rounded anvil which contacts the inside curved surface and a flat spindle for contacting the outside of the work, thus producing single point contact and permitting accurate gaging of curved surface thicknesses in thousandths of an inch.

The No. 576 micrometer will measure cylinders with walls up to ½ inch thick and inside diameters down to 9/16 inch; the No. 211, walls up to 1 inch thick with inside diameters to 5/8 inch; the No. 577, walls up to 1 inch thick with inside diameters to 3/8 inch.

The No. 211 has a smooth black enameled frame while the No. 576 and 577 have full finish SATIN-CHROME frames. All three are graduated in thousandths of an inch and the No. 576 and No. 577 are also available in Metric graduated in hundredths of a millimeter.

All of these micrometers feature Balanced Design, No-Glare SATIN-CHROME Finish on sleeve and thimble (also on frames of No. 576 and No. 577); micro-lapped finish on end of spindle; one piece hardened spindle with threads hardened, ground from the solid and stabilized; convenient decimal equivalents; Quick Reading staggered graduations with every thousandth numbered; simple sleeve adjustment and other precision-plus features. See listings below for further specifications.

Cat. No.	EDP No.	Range	Graduation	Description
576R	52604	0 to ½"	.001"	With Ratchet Stop, No Lock Nut —Full Finish Tapered Frame
211P	50733	0 to 1"	.001"	Without Ratchet Stop, No Lock Nut —Black Enameled Tapered Frame
577P	52607	0 to 1"	.001"	Without Ratchet Stop, No Lock Nut —Full Finish Tapered Frame
			METRIC	
576MR	52605	0 to 13 mm	0.01 mm	With Ratchet Stop, No Lock Nut —Full Finish Tapered Frame
577MP	52608	0 to 25 mm	0.01 mm	Without Ratchet Stop, No Lock Nut —Full Finish Tapered Frame

NOTE: Ball Attachment No. 247 also available for standard micrometers. See description on page 30.

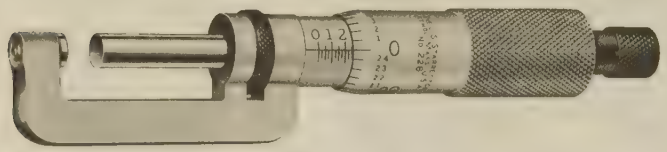
Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered

Packed One in a Box

ALSO AVAILABLE WITH CARBIDE FACES

Hub Micrometer Caliper

No. 228—*0 to 1 Inch*



THE Starrett No. 228 SATIN-CHROME Micrometer is an ideal tool for precision measuring of hub thickness, for insertion through small holes to measure thickness, and for many other related uses. This full finished Hub Micrometer has a specially designed shallow frame which makes it possible to easily pass through a ¾ inch hole and will measure hub lengths and thicknesses from 0 up to 1 inch.

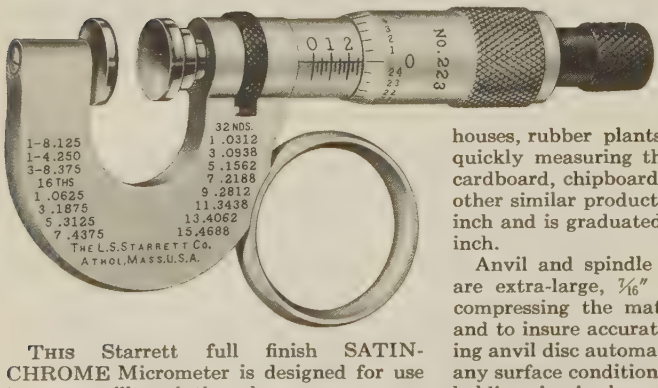
Precision made throughout with many outstanding Starrett features like No-Glare, Rust-Resistant SATIN-CHROME Finish; micro-lapped finish on anvil and spindle faces; one-piece hardened spindle with threads ground from the solid; rigid one-piece drop forged steel frame; Quick Reading graduations, etc. Graduated in thousandths of an inch and furnished with ratchet stop and lock nut.

Cat. No.	EDP No.	Range	Graduation	Description
228RL	50920	0 to 1"	.001"	With Ratchet Stop and Lock Nut
228XRL	50921	0 to 1"	.001"	With Ratchet Stop and Lock Nut; Tungsten Carbide Measuring Faces

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered—Packed One in a Box

Paper Gage Micrometer Caliper

No. 223 — *0 to 11/32 Inch*

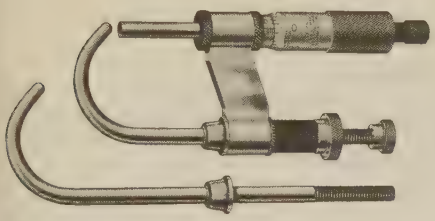


THIS Starrett full finish SATIN-CHROME Micrometer is designed for use in paper mills, printing shops, paper warehouses, rubber plants, etc., for accurately, quickly measuring the thickness of paper, cardboard, chipboard, rubber, plastics, and other similar products. Has a range of 11/32 inch and is graduated in thousandths of an inch.

Anvil and spindle faces are lapped and are extra-large, 7/16" diameter, to prevent compressing the material being measured and to insure accurate readings. The floating anvil disc automatically adjusts itself to any surface condition. A convenient finger-holding ring is also provided.

Cat. No.	EDP No.	Range	Graduation	Description
223RL	50768	0 to 11/32"	.001"	With Ratchet Stop, Lock Nut and Ring

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered—Packed One in a Box



Inspectors' Micrometer Caliper Gage—No. 175

0 to 2 Inch

- ★ For Inspecting, Measuring Wall Thickness of Boilers Flues, Tubing, Stampings, etc.
- ★ No-Glare SATIN-CHROME Finish on Thimble and Sleeve
- ★ With Ratchet Stop and Lock Nut

SINCE this gage is easily inserted through any small hole, it can be used to measure the thickness of either flat or cylindrical walls in boilers, flues, tubing, stampings, ship plate, etc., impossible to gage with other types of measuring equipment.

The gage consists of a micrometer head, reading in thousandths of an inch, which has an offset arm and two curved, round-end anvils giving a range of 0 to 2 inches. The anvils are interchangeable with a range of 0 to 1 and 1 to 2 inches respectively and may be turned out of gaging position by loosening a lock nut to permit inserting the anvil through small holes.

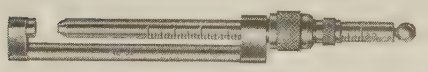
Added plus features—No-Glare SATIN-CHROME Finish on thimble and sleeve—ratchet stop—and convenient lock nut. Furnished with 1 inch standard in attractive finished case.

Cat. No.	EDP No.	Range	Graduation	Description
175RLZ	50659	0 to 2"	.001"	With Ratchet Stop, Lock Nut and Standard in Case

Furnished in Attractive, Protective Case
Packed One in a Box

Inspectors' Gage—No. 31

0 to $1\frac{13}{16}$ Inch

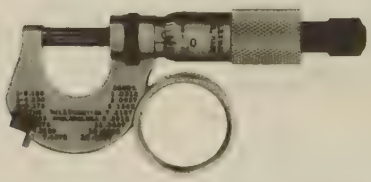


ANOTHER useful gage for measuring the thickness of ship plates, boiler plates, etc. where the measurement has to be taken through a bolt hole or a small drilled hole. Very compact, only $\frac{7}{16}$ inches wide, and ideal for carrying in the pocket. Has a range of 0 to $1\frac{13}{16}$ inches and is graduated in both 32nds and 40ths. This gage has a sliding measuring rod which is adjusted to contact the work and then locked by a large knurled nut. After sliding the small knurled friction sleeve up against the nut, the measurement is read off the scale at the right or top of the sleeve. Made of steel, nicely finished.

Cat. No.	EDP No.	Range	Graduation
31	50202	0 to $1^{13}/_{16}$"	32nds and 40ths

Packed One in a Box

Can Curl Micrometer
No. 209RL

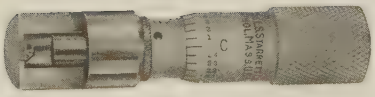


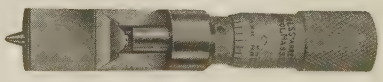
Starrett No. 209RL features a special rest foot and finger ring for consistent measurement of the curl thickness on aerosol cans with 1″ diameter openings.

Cat. No.	EDP No.	Range	Graduation
209RL	56473	0 to .500″	.001″

Packed One in a Box

Can Seam Micrometers
Stainless Steel
No. 207—No. 208 Series





Starrett Can Seam Micrometers are made of stainless steel and designed to measure the width and depth of can seams. Range is 0 to .375″ and depth range on No. 208D is .200″. Graduations are in thousandths of an inch. The No. 207 Micrometer has a snub nose which permits measuring aerosol type cans.

Cat. No.	EDP No.	Description
207Z	56173	Stub Nose Type for aerosol cans
208Z	56175	Without Depth Gage
208DZ	56176	With Depth Gage

Furnished in Soft Case
Packed One in a Box

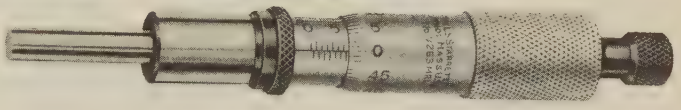
Micrometer Heads

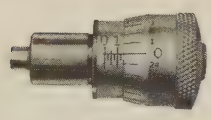
0 to ¼ Inch, 0 to ½ Inch, 0 to 1 Inch, 0 to 13 mm and 0 to 25 mm (Metric)

No. 263, No. 463, No. 464 Series

No. 263RL

No. V263MRL (Metric)





No. 464P

- ★ Satin Chrome Finish—No Glare, Resists Rust
- ★ Micro-Lapped Finish on Spindle Face
- ★ One Piece Extra-Rigid Spindle
- ★ Hardened Threads—Ground from the Solid and Stabilized
- ★ Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures
- ★ New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability
- ★ Quick Reading Figures On Thimble
- ★ Quick Easy Adjustment
- ★ Lock Nut—Locks Spindle at Any Reading
- ★ Ratchet Stop or Friction Thimble—Permits Consistent Measurements. Also see page 9.

Used on machine tools, fixtures, special gages, tooling, and other equipment where micrometer accuracy in settings and adjustment is required.

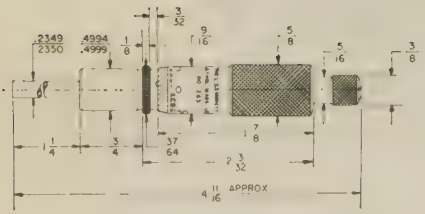
Range	Graduation	Cat. No.	EDP No.	Description
0 to ¼"	.001"	464P	56657	Without Ratchet Stop, No Lock Nut
0 to ½"	.001"	463P	52440	Without Ratchet Stop, No Lock Nut
		463L	52442	Without Ratchet Stop, With Lock Nut
		463RL	52443	With Ratchet Stop and Lock Nut
		RV463RL	57073	Reverse Reading With RS and LN
	.0001"	T463P	52446	Without Ratchet Stop, No Lock Nut
		T463L	52448	Without Ratchet Stop, With Lock Nut
		T463RL	52449	With Ratchet Stop and Lock Nut
0 to 13 mm	0.01 mm	463MP	52444	Without Ratchet Stop, No Lock Nut
		463MR	52445	With Ratchet Stop, No Lock Nut
		463MRL	52452	With Ratchet Stop and Lock Nut
0 to 1"	.001"	263P	51251	Without Ratchet Stop, No Lock Nut
		263R	51252	With Ratchet Stop, No Lock Nut
		263L	51253	Without Ratchet Stop, With Lock Nut
		263RL	51254	With Ratchet Stop and Lock Nut
		263F	51255	With Friction Thimble, No Lock Nut
		263FL	51256	With Friction Thimble and Lock Nut
		RV263RL	57071	Reverse Reading With RS and LN
	.0001"	T263P	51258	Without Ratchet Stop, No Lock Nut
		T263R	51259	With Ratchet Stop, No Lock Nut
		T263L	51260	Without Ratchet Stop, With Lock Nut
		T263RL	51261	With Ratchet Stop and Lock Nut
		T263FL	51262	With Friction Thimble and Lock Nut
0 to 25 mm	0.01 mm	263MRL	51257	With Ratchet Stop and Lock Nut
	0.002 mm	V263MRL	55962	With Ratchet Stop and Lock Nut

NOTE: No. 263 and 463 Micrometer Heads also available with carbide face on spindle.

Packed One in a Box

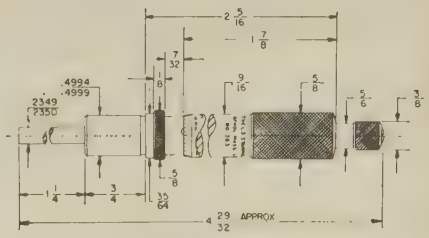
Micrometer Heads
No. 263, No. 463, No. 464 Series

Dimensional Drawings



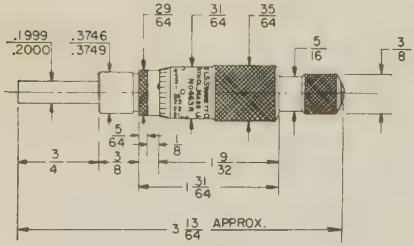
No. 263R
Range 0-1 inch

Note: No. 263 also available with 3/8" diam. clamping surface.

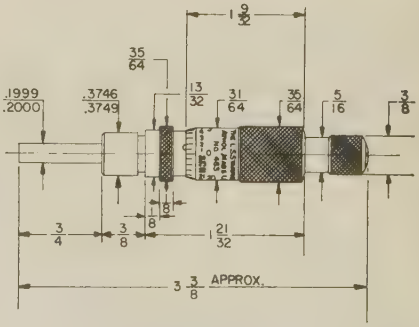


No. 263RL
Range 0-1 inch

Length of clamping surface on No. 263MRL and No. V263MRL is 19 mm; diameter 12.7 mm; length from shoulder to end of spindle aproximately 50 mm.



No. 463R
Range 0-½ inch

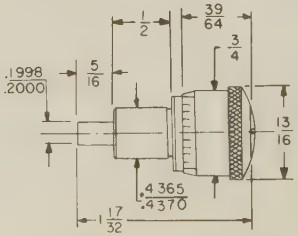


No. 463RL
Range 0-½ inch

Length of clamping surface on No. 463M is 9.5 mm; diameter 9.5 mm; length from shoulder to end of spindle approximately 28 mm.

Note: No. 1263 Stainless Steel Micrometer Heads, next page, have same dimensions as No. 263.

Note: No. 1463 Stainless Steel Micrometer Heads, next page, have same dimensions as No. 463.



No. 464P
Range 0-¼ inch

Micrometer Heads

Stainless Steel

0 to ½ Inch and 0 to 1 Inch

No. 1263, No. 1463 Series

- ★ Satin Finish Stainless Steel—Rust and Stain Resistant
- ★ Micro-Lapped Finish on Spindle Face
- ★ One-Piece Extra-Rigid Spindle
- ★ Hardened Threads—Ground from the Solid and Stabilized
- ★ Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures
- ★ New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability
- ★ Quick Reading Figures—Every Thousandth Numbered
- ★ Quick Easy Adjustment
- ★ Lock Nut—Locks Spindle at Any Reading
- ★ Ratchet Stop—Permits Consistent Measurements

STARRETT ½ inch and 1 inch Micrometer Heads are available in Satin Finish Stainless Steel. Both are identical in size and range to No. 263 and No. 463 Micrometer Heads but are made of Stainless Steel throughout for extra long life. Recommended for electronic applications, on machine tools, special gages, tooling, and any other equipment where micrometer accuracy in settings and adjustment is required.

Available in 0 to ½ inch or 0 to 1 inch sizes with graduations in thousandths or ten-thousandths of an inch, and with or without ratchet stop and lock nut.

In addition to Stainless Steel, other features include micro-lapped finish on end of spindle, one-piece spindle with hardened threads ground from the solid and stabilized, and other features listed above.

Cat. No.	EDP No.	Range	Graduation	Description
1463P	53206	0 to ½"	.001"	Without Ratchet Stop, No Lock Nut
1463RL	53207	0 to ½"	.001"	With Ratchet Stop and Lock Nut
T1463P	53208	0 to ½"	.0001"	Without Ratchet Stop, No Lock Nut
T1463RL	53209	0 to ½"	.0001"	With Ratchet Stop and Lock Nut
1263P	53198	0 to 1"	.001"	Without Ratchet Stop, No Lock Nut
1263L	53200	0 to 1"	.001"	Without Ratchet Stop, With Lock Nut
1263RL	53201	0 to 1"	.001"	With Ratchet Stop and Lock Nut
T1263P	53202	0 to 1"	.0001"	Without Ratchet Stop, No Lock Nut
T1263RL	53203	0 to 1"	.0001"	With Ratchet Stop and Lock Nut

NOTE: No. 1463 dimensions same as No. 463 drawings, previous page. Clamping surface 3/8" long x 3/8" diameter; length from shoulder to end of spindle approximately 1-1/8" at zero; spindle (.200" diameter) extends 3/4" at zero.

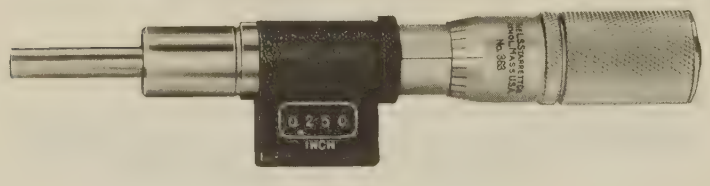
NOTE: No. 1263 dimensions same as No. 263 drawings, previous page. Clamping surface 3/4" long x 1/2" diameter; length from shoulder to end of spindle approximately 2" at zero; spindle (.235" diameter) extends 1-1/4" at zero.

Packed One in a Box

Digital Micrometer Heads

No. 363 Series — *0 to 1 Inch*

No. 363M Series — *0 to 25 mm (Metric)*



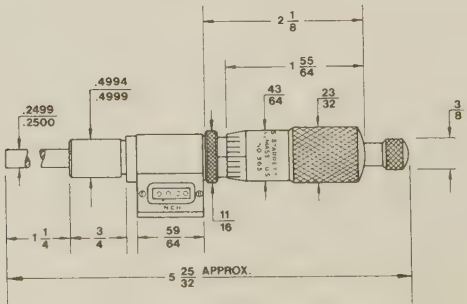
- ★ **Direct digital readout to .001" (or 0.01 mm)**
- ★ **Readings taken at a glance**
- ★ **Ratchet stop or friction thimble for repeat reading accuracy**
- ★ **Lock nut for holding readings**
- ★ **No-glare satin chrome finish**
- ★ **One piece spindle—micro-lapped spindle face**

This new measuring and work locating tool combines the precision performance and fine workmanship of a conventional Starrett micrometer head with the ease of a digital readout. Direct-reading thousandths of an inch (or hundredths of a mm) appear in the counter as white numbers on a black background, and are easy to read from a distance. A great timesaver for measuring and locating work on machine tool tables, fixtures and special gages.

Available with ratchet stop or friction thimble for repeat reading accuracy, and with lock nut to secure the spindle at any setting or reading. No-glare satin chrome finish—micro-lapped spindle face.

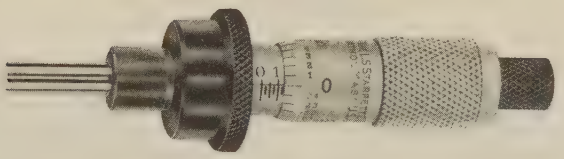
Cat. No.	EDP No.	Range	Graduation	Description
363L	56297	0 to 1"	.001"	With Lock Nut Only
363RL	56298			With Ratchet Stop and Lock Nut
363FL	56299			With Friction Thimble and Lock Nut
RV363RL	57072			Reverse Reading With RS and LN
363ML	56302	0 to 25 mm	0.01 mm	With Lock Nut Only
363MRL	56303			With Ratchet Stop and Lock Nut
363MFL	56304			With Friction Thimble and Lock Nut

Packed One in a Box

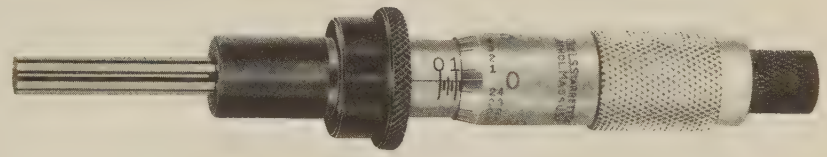


Micrometer Heads with Non-Rotating Spindle

.001 Inch Graduation



No. 261L, 1/2" range, with speeder (resembling ratchet stop) and lock nut



No. 262L, 1" range, with lock nut

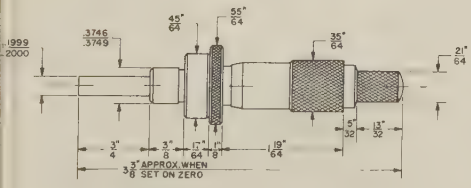
When the thimble of these micrometer heads is turned, the spindle travels along its axis, but does not rotate. This feature is useful in driving positioning tables directly without an intermediate connecting device. It is also useful in gaging jobs where scratches on the work surface cannot be tolerated, or where there is risk of distortion when spindle meets work—as in measuring soft or elastic materials. Spindle wear is also reduced since there is no rotational friction as its face contacts the work.

Features: micro-lapped spindle face; hardened threads ground from the solid and stabilized; no-glare satin chrome finish; staggered sleeve graduations and numbered thimble graduations for precise readings.

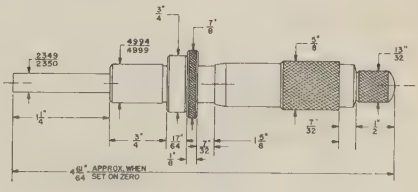
Cat. No.	EDP No.	Range	Graduation	Description
261L	55944	0 to ½"	.001"	With non-rotating spindle; with speeder and lock nut
262L	55945	0 to 1"	.001"	With non-rotating spindle; without ratchet stop, with lock nut
262RL	55946	0 to 1"	.001"	With non-rotating spindle; with ratchet stop and lock nut

Packed One in a Box

No. 261L



No. 262L



Longer Range Micrometer Head

0 to 2 Inch
0 to 50 mm (Metric)

No. 63 Series

- ★ SATIN-CHROME Finish—No Glare, Resists Rust
- ★ Long Spindle Travel—0-2 Inches
- ★ Micro-Lapped Finish on Spindle Face
- ★ One Piece Extra-Rigid Spindle
- ★ Hardened Threads—Ground from the Solid and Stabilized
- ★ Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures
- ★ New Sleeve Design with Staggered Lines—Assures Precise, Easy Readability
- ★ Quick Reading Figures—Every Thousandth Numbered
- ★ Quick Easy Adjustment
- ★ Lock Nut—Locks Spindle at Any Reading
- ★ Ratchet Stop—Permits Consistent Measurements

WHEN long spindle travel is required, Starrett No. 63 Micrometer Heads provide a two-inch range that will handle most applications, such as in electronic equipment, machine tools, special gages, tooling, etc.

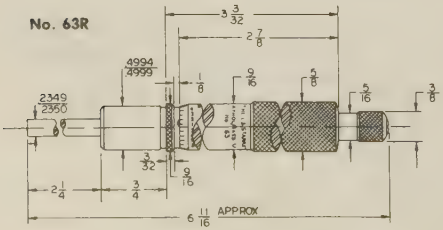
Total range is 0–2 inches. Available with graduations in thousandths or ten-thousandths of an inch. Can be furnished with ratchet stop and lock nut.

No-Glare SATIN-CHROME Finish plus Quick Reading graduations make these micrometer heads extremely easy to read. The SATIN-CHROME finish is also highly resistant to stains, corrosion, and wear.

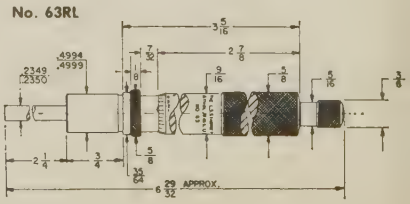
Cat. No.	EDP No.	Range	Graduation	Description
63P	50305	0 to 2"	.001"	Without Ratchet Stop, No Lock Nut
63L	50306	0 to 2"	.001"	Without Ratchet Stop, With Lock Nut
63RL	50307	0 to 2"	.001"	With Ratchet Stop, and Lock Nut
T63P	50308	0 to 2"	.0001"	Without Ratchet Stop, No Lock Nut
T63RL	50309	0 to 2"	.0001"	With Ratchet Stop, and Lock Nut
63MRL	55939	0 to 50 mm	0.01 mm	With Ratchet Stop and Lock Nut

Packed One in a Box

No. 63R



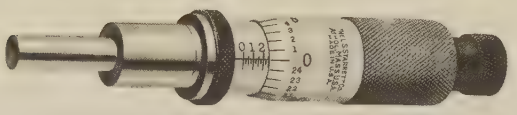
No. 63RL



Heavy Duty Micrometer Head

0 to 25 mm (Metric), 0 to 1 Inch

No. 663 Series



- ★ SATIN-CHROME Finish—No Glare, Resists Rust
- ★ Heavy Duty—Extra-Large One-Piece Rigid Spindle
- ★ Hardened Threads—Ground from the Solid and Stabilized
- ★ Micro-Lapped Finish on Spindle Face
- ★ Easy-to-Read—Well Balanced Thimble Diameter with Distinct Figures
- ★ New Sleeve Design with Staggered Lines —Assures Precise, Easy Readability
- ★ Quick Reading Figures—Every Thousandth Numbered
- ★ Quick Easy Adjustment
- ★ Lock Nut—Locks Spindle at Any Reading
- ★ Ratchet Stop—Permits Consistent Measurements

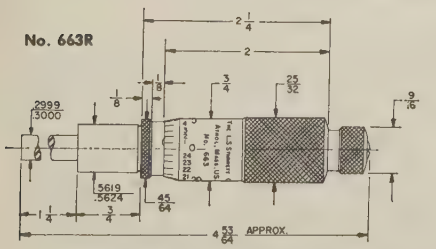
STARRETT No. 663 Micrometer Heads have heavy-duty construction and are designed for continued precision and long life under adverse conditions. Especially adapted for hard usage in electronic applications, on machine tools, special gages, tooling and all equipment requiring micrometer accuracy in settings and adjustment.

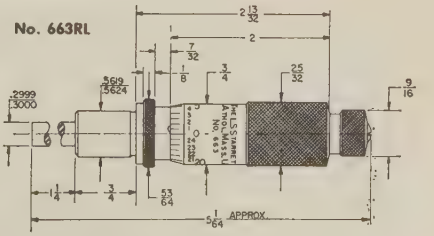
Available in 0 to 1 inch range and can be furnished with graduations in thousandths or ten-thousandths of an inch, also metric. Can be furnished with different combinations of ratchet stop and lock nut listed below.

Besides heavy-duty design, other features include Starrett No-Glare SATIN-CHROME Finish, Quick Reading graduations with every thousandth numbered, hardened threads ground from the solid and stabilized, micro-lapped finish on spindle face, plus many more features described above.

Cat. No.	EDP No.	Range	Graduation	Description
663P	52270	0 to 1"	.001"	Without Ratchet Stop, No Lock Nut
663R	52771	0 to 1"	.001"	With Ratchet Stop, No Lock Nut
663L	52772	0 to 1"	.001"	Without Ratchet Stop, With Lock Nut
663RL	52773	0 to 1"	.001"	With Ratchet Stop and Lock Nut
T663P	52775	0 to 1"	.0001"	Without Ratchet Stop, No Lock Nut
T663R	52776	0 to 1"	.0001"	With Ratchet Stop, No Lock Nut
T663L	52777	0 to 1"	.0001"	Without Ratchet Stop, With Lock Nut
T663RL	52778	0 to 1"	.0001"	With Ratchet Stop and Lock Nut
663MRL	52774	0 to 25 mm	0.01 mm	With Ratchet Stop and Lock Nut

Packed One in a Box





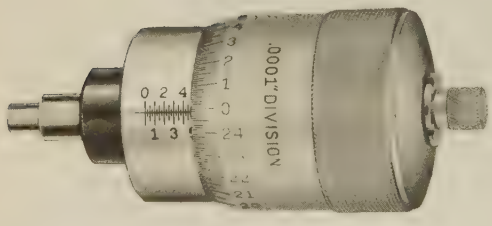
NOTE: Clamping surface on No. 663MRL is 19 mm long x 14.3 mm diameter; length from shoulder to end of spindle is approximately 50 mm.

Micrometer Heads

2 1/16" Thimble Diameter with Staggered Tenth Graduations

No. T465 Series—*0 to 1 Inch and 0 to 2 Inch*

0 to 25mm and 0 to 50mm (Metric)



★ **For All Applications Requiring Ultra-Fine Adjustment**

★ **Direct Reading in Ten-Thousandths with Staggered Graduations**

★ **Staggered Graduations and Figures on Sleeve**

★ **SATIN-CHROME Finish**

★ **Available with or without Speeder**

THE new Starrett No. T465 Micrometer Head is designed for use in electronic equipment requiring ultra-fine adjustment in ten-thousandths of an inch, and for machine tools, fixtures, special gages and tools, all special mountings, or wherever micrometer accuracy in settings and adjustment is required.

This new micrometer head reads directly in ten-thousandths of an inch and has a 1-inch or 2-inch range. The thimble is 2 1/16" diameter with widely spaced direct-reading "tenth" graduations, permitting easy adjustment and reading to the closest accuracy.

Another highly useful feature is the new spindle adjustment which permits adjusting the spindle for length approximately ±1/16". If the spindle is to be located against a definite stop and a different zero position is required, simply loosen the cap screw on the end of the thimble, set the spindle to the desired stop, then readjust the tapered thimble nut on the spindle to the position where the zero on the thimble registers with the zero increment graduation on the inside shell and then tighten the cap screw locking the thimble in its new position. In achieving this adjustable feature, we have still retained our positive taper lock large thimble bearing.

Overall length at zero is 4 5/8" for 1" size, 6 5/8" for 2" size; thimble diameter 2 1/16"; length of clamping surface 9/16", diameter 1"; length from face of clamping surface to end of spindle at zero, approx. 1 3/8" for 1" size, 2 3/8" for 2" size; major diameter of spindle 1/2" with 5/16" diam. 3/8" back from face of spindle. Micrometer heads built to individual requirements also available on special order.

Other precision features of this fine tool are Quick Reading graduations with every thousandth numbered, No Glare SATIN-CHROME Finish on thimble and sleeve, one-piece hardened spindle with threads ground from the solid and stabilized, micro-lapped finish on end of spindle.

Cat. No.	EDP No.	Range	Graduation	Description
T465P-1	52455	0 to 1"	.0001"	Without Ratchet Stop, No Lock Nut, Without Speeder
T465SP-1	52456			Without Ratchet Stop, No Lock Nut, With Speeder
T465P-2	52457	0 to 2"	.0001"	Without Ratchet Stop, No Lock Nut, Without Speeder
T465SP-2	52458			Without Ratchet Stop, No Lock Nut, With Speeder
465MP-25	52459	0 to 25 mm	0.002 mm	Without Ratchet Stop, No Lock Nut, Without Speeder
465MSP-25	52460			Without Ratchet Stop, No Lock Nut, With Speeder
465MP-50	52461	0 to 50 mm	0.002 mm	Without Ratchet Stop, No Lock Nut, Without Speeder
465MSP-50	52462			Without Ratchet Stop, No Lock Nut, With Speeder

NOTE: Furnished without Speeder unless otherwise specified.
NOTE: No. 465 dimensions same as No. 468 drawing, next page.

Packed One in a Box

Micrometer Heads

No. T468 Series—*0 to 1 Inch and 0 to 2 Inch*

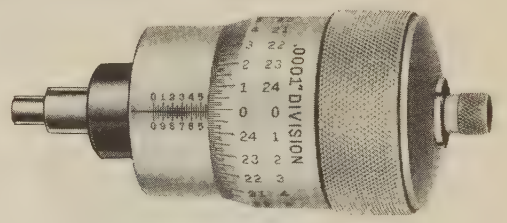
No. 468MP Series—*0 to 25mm and 0 to 50mm (Metric)*

★ **Double Graduations in Red and Black for Reading Both Ways**

★ **2 1/16" Thimble Diameter with Staggered Tenth Graduations**

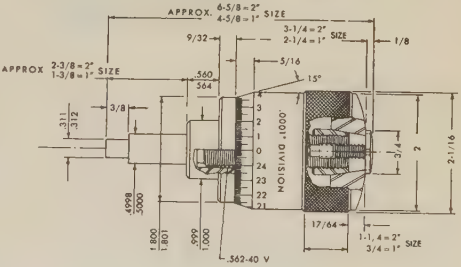
★ **SATIN-CHROME Finish**

★ **Available with or without Speeder**



STARRETT No. T468 Micrometer Heads are similar to No. T465 Heads except that double graduations in red and black are provided on the sleeve and thimble permitting reading both ways with the spindle moving in either direction. This feature is invaluable on many instruments and microwave applications.

Like the No. T465, the No. T468 has 2 1/16" thimble diameter with direct reading graduations in ten-thousandths of an inch. Available in one or two inch range; also in metric. Furnished with or without speeder.



Sketch showing major dimensions of No. T465 and No. T468 Micrometer Heads in 1 inch and 2 inch sizes.

Cat. No.	EDP No.	Range	Graduation	Description
T468P-1	52466	0 to 1"	.0001"	Without Ratchet Stop, No Lock Nut, Without Speeder
T468SP-1	52467			Without Ratchet Stop, No Lock Nut, With Speeder
T468P-2	52468	0 to 2"	.0001"	Without Ratchet Stop, No Lock Nut, Without Speeder
T468SP-2	52469			Without Ratchet Stop, No Lock Nut, With Speeder
468MP-25	52470	0 to 25 mm	0.002 mm	Without Ratchet Stop, No Lock Nut, Without Speeder
468MSP-25	52471			Without Ratchet Stop, No Lock Nut, With Speeder
468MP-50	52472	0 to 50 mm	0.002 mm	Without Ratchet Stop, No Lock Nut, Without Speeder
468MSP-50	52473			Without Ratchet Stop, No Lock Nut, With Speeder

NOTE: Furnished without Speeder unless otherwise specified.

Packed One in a Box

Special Micrometer Heads

IN addition to standard Micrometer Heads, Starrett has also designed and manufactured many special types of Micrometer Heads for widely diversified applications requiring micrometer accuracy in settings and adjustment. These special Heads are designed to exact specifications to meet the special needs of many industries such as wavemeters and other equipment in the Electronics industry, for machine tools, also fixtures, special gages and tools, and all special mountings.

These custom made Starrett Micrometer Heads can be furnished to suit your particular requirements in a wide choice of sizes, range and graduations. Available in Stainless Steel, SATIN-CHROME or other corrosion resistant finishes.

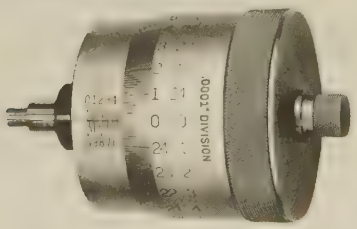
We'll be glad to work with you on your special requirements. For quotations or recommendations, write our Special Order Department. Also see page 273.

Micrometer Heads

3 1/16" Thimble Diameter with Staggered Tenth Graduations

No. T461 Series—*0 to 1 Inch and 0 to 25mm (Metric)—Single Row Graduations*

No. T462 Series—*0 to 1 Inch and 0 to 25mm (Metric)—Double Row Graduations*



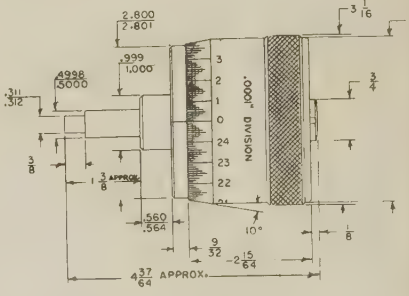
- ★ For All Applications Requiring Ultra-Fine Adjustment
- ★ Direct Reading in Ten-Thousandths with Staggered Graduations
- ★ SATIN-CHROME Finish
- ★ Available with or without Speeder

THE new Starrett No. T461 and No. T462 Micrometer Heads are designed for ultra-fine adjustment in ten-thousandths of an inch, or wherever micrometer accuracy in settings and adjustment is required.

These new micrometer heads read directly in ten-thousandths of an inch and have a 1-inch range. The thimble is 3 1/16" diameter with widely spaced direct-reading "tenth" graduations, permitting easy adjustment and reading to the closest accuracy. No. T461 Micrometer Heads have a single row of graduations and No. T462 Heads have a double row of graduations permitting reading both ways with the spindle moving in either direction. This feature is invaluable on many instruments and microwave applications.

Another highly useful feature is the new spindle adjustment which permits adjusting the spindle for length approximately ±1/16".

Other precision features are Quick Reading graduations with every thousandth numbered, No Glare SATIN-CHROME Finish on thimble and sleeve, one-piece hardened spindle with threads ground from the solid and stabilized, micro-lapped finish on end of spindle.



Sketch showing major dimensions of No. T461 and No. T462 Micrometer Heads.

Cat. No.	EDP No.	Range	Graduation	Description
T461P	52432	0 to 1"	.0001"	Single Row of Graduations, Without Speeder
T461SP	52433			Single Row of Graduations, With Speeder
461MP	52436	0 to 25 mm	0.002 mm	Single Row of Graduations, Without Speeder
461MSP	52437			Single Row of Graduations, With Speeder
T462P	52434	0 to 1"	.0001"	Double Row of Graduations, Without Speeder
T462SP	52435			Double Row of Graduations, With Speeder
462MP	52438	0 to 25 mm	0.002 mm	Double Row of Graduations, Without Speeder
462MSP	52439			Double Row of Graduations, With Speeder

NOTE: Furnished without Speeder unless otherwise specified.

Packed One in a Box

Super Precision Micrometer Heads

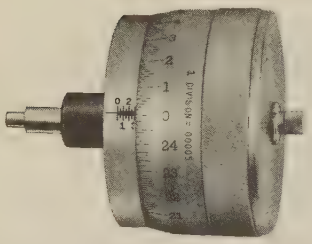
No. T469 Series—*0 to 1 Inch*

Graduated 50 Millionths or Tenth-Thousandths of an Inch

No. 469M Series—*0 to 25mm (Metric)*

Graduated One-Thousandth or Two-Thousandths of a mm

4 1/16 Inch Diameter Thimble—Aluminum Thimble and Sleeve



★**Super Precision—Two Models with Accuracy in 50 Millionths or Ten-Thousandths of an Inch.**

★**Direct Reading—Large 4 1/16" Thimble Diameter—Widely Spaced, Staggered Graduations.**

★**Staggered Graduations and Figures on Sleeve**

★**Aluminum Thimble and Sleeve—SATIN-CHROME Finish.**

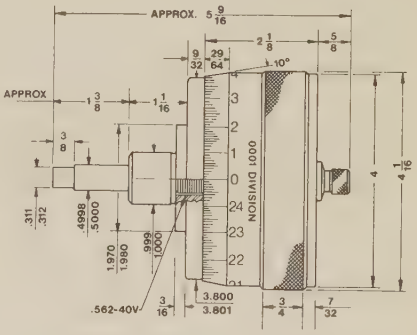
★**Available With or Without Speeder.**

These heads are especially suited for use in electronic equipment requiring ultra-fine adjustment or on machine tools, fixtures, special gages and tools, special mountings, or wherever extremely close micrometer accuracy in settings and adjustment is required.

Both micrometer heads have an extra large thimble diameter approximately 4 1/16" O.D. which makes possible highly accurate, easy-to-read, widely spaced graduations. Thimble and sleeve are made of aluminum to reduce weight. Staggered, quick reading graduations and no-glare satin-chrome finish contribute to easier, faster readings. Also available on special order, double graduations in red and black on sleeve and thimble permitting reading both ways with the spindle moving in either direction.

Another highly useful feature is the new spindle adjustment which permits adjusting the spindle for length approximately ±1/16". Simply loosen the cap screw on the end of the thimble, set the spindle to the desired stop, then readjust the tapered thimble nut on the spindle to the position where the zero on the thimble registers with the zero increment graduation on the inside shell and then tighten the cap screw locking the thimble in its new position.

Micrometer head spindle is one piece and hardened with threads ground from the solid and stabilized. Micro-lapped on end of spindle, or can be furnished faced with tungsten carbide. Heads are available with or without speeder.



Sketch showing major dimensions of No. T469 and 469M Micrometer Heads.

Cat. No.	EDP No.	Range	Graduation	Description
T469H	52474	0 to 1"	.000050"	Without Ratchet Stop, No Lock Nut, Without Speeder
T469HSP	52475			Without Ratchet Stop, No Lock Nut, With Speeder
T469	52476		.0001"	Without Ratchet Stop, No Lock Nut, Without Speeder
T469SP	52477			Without Ratchet Stop, No Lock Nut, With Speeder
469MH	52478	0 to 25 mm	0.001 mm	Without Ratchet Stop, No Lock Nut, Without Speeder
469MHSP	52479			Without Ratchet Stop, No Lock Nut, With Speeder
469M	52480		0.002 mm	Without Ratchet Stop, No Lock Nut, Without Speeder
469MSP	52481			Without Ratchet Stop, No Lock Nut, With Speeder

NOTE: Available with or without Speeder. Furnished without Speeder unless otherwise specified.

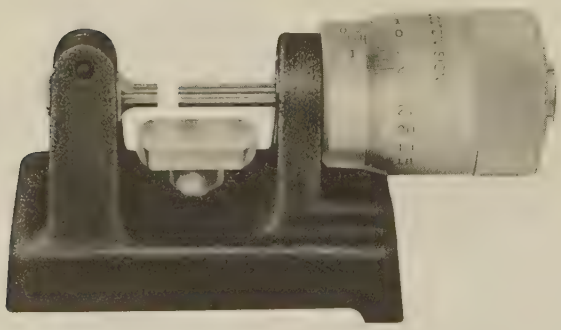
NOTE: Also available on special order with Double Graduations for reading both ways with spindle moving in either direction.

Packed One in a Box

Bench Micrometer

0 to 1 Inch

No. 677Z



- ★ **Direct readings in ten-thousandths of an inch over a full 1" range**
- ★ **Rotatable work table with 7/16" height adjustment**
- ★ **No glare satin chrome finish on thimble and sleeve**
- ★ **Mirror lapped finish on anvil and spindle faces**

No. 677 Bench Micrometer is especially suited to precision measurements where the work must be brought to the gage. It measures directly in ten-thousandths of an inch with readings from 0-1" taken from the micrometer head without vernier scale reference.

Work is staged between the anvil and spindle on an adjustable table which can be raised to selected height and locked in position by turning a knurled thumb screw on back of the base. Made of cast iron with black wrinkle finish, the base is heavily proportioned to sustain gage accuracy and assure stability in use. It stands on three machined pads. The micrometer head has a 2" diameter thimble for easy handling and staggered graduations on no-glare satin chrome finish for fast, accurate readings. The spindle and anvil faces are micro-lapped square and parallel. The anvil, while easily removed by loosening a clamping screw, is factory sealed in position to insure tamper-proof accuracy in use.

Cat. No.	EDP No.	Graduation	Range	Work Table	Base
677Z	55888	.0001"	0 to 1"	1-1/2" diameter x 7/16" height adjustment	4-7/8" long x 2-3/4" wide x 3-3/16" high

NOTE: may be used with any A.G.D. dial indicator or with No 812 Electronic Gages by substituting No. 812-2 Cartridge Type Gaging Head for the anvil. Installation, however, must be done at the factory.

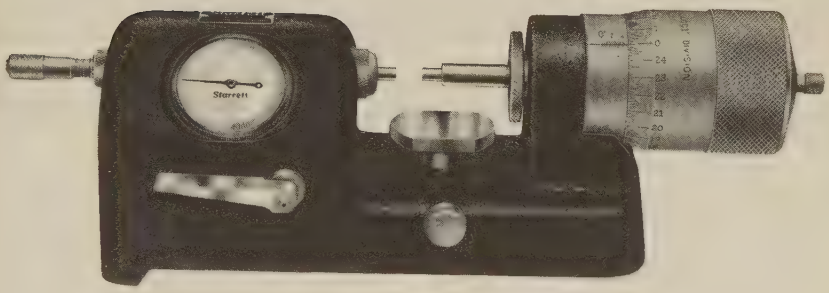
NOTE: micrometer head also available with speeder; sent without speeder unless otherwise specified.

Furnished in Attractive, Protective Case; Packed One in a Box

Bench Micrometer

0 to 2 inches

No. 673Z



★ **Super-Precision Jeweled Dial Indicator for Comparator Measurements to 50 Millionths of an Inch—High-Precision Micrometer Head with Direct Readings in Ten-Thousandths of an Inch, Range 0-2 Inches.**

★ **Also Can Be Used with No. 812 Series Electronic Gages by using No. 673A Adapter for No. 812-2 Cartridge Type Electronic Gaging Head.**

★ **Anvil Retractor Lever for Repeated Measurements—Anvil Pressure Adjustable from 8 oz. to 3 lbs.**

★ **Linear, Friction-Free Motion Transfer Mechanism Between Anvil and Indicator Assures High Accuracy.**

★ **Large Diameter (3 $^{1}/_{16}$") Micrometer Head with Staggered, Widely Spaced Graduations and SATIN—CHROME Finish for Easy, Fast Readings—Furnished with Speeder.**

★ **Special No-Distortion Spindle Lock.**

★ **Long-Life Tungsten Carbide Faces on Anvil and Spindle.**

★ **Adjustable Work Table—Diameter 2 $^{15}/_{64}$", Vertical Adjustment $^{7}/_{8}$".**

The new Starrett No. 673 Bench Micrometer is a fine precision instrument ideal for bench use either in the shop or inspection laboratory. A highly accurate and universal instrument, it can be used as a comparator, measuring to 50 millionths of an inch (.000050″); or for direct measuring, to ten-thousandths of an inch (.0001″). Work lengths from 0 to 2 inches can be measured.

The base of the No. 673 Bench Micrometer is a heavy, rigid casting incorporating at the left end a movable anvil which actuates a Starrett Super-Precision Dial Indicator. Dial Indicator has jeweled bearings, is graduated in 50 millionths of an inch (.000050″), reads 0-3-0, range .006″, and can be adjusted to zero. The anvil actuates the indicator through a linear friction-free motion transfer mechanism and can be retracted by a lever for repeated measurements. Anvil measuring pressure is adjustable from 8 oz. to 3 lbs. by a graduated control knob. Anvil is faced with tungsten carbide for extra long life.

(Continued on next page)

Bench Micrometer

No. 673

A heavy-duty high-precision micrometer head is mounted at the right end of the base. The head reads directly in ten-thousandths of an inch and has a two-inch range. Large thimble diameter, approximately 3 1/16", makes possible highly accurate, easy-to-read, widely spaced graduations. Special staggered, quick reading graduations in combination with Starrett no-glare SATIN-CHROME finish on both thimble and sleeve also contribute to easier, faster readings. The head is furnished with a speeder and has a special spindle lock which firmly holds the spindle at any setting without distortion. Spindle is tungsten carbide faced for extra-long life.

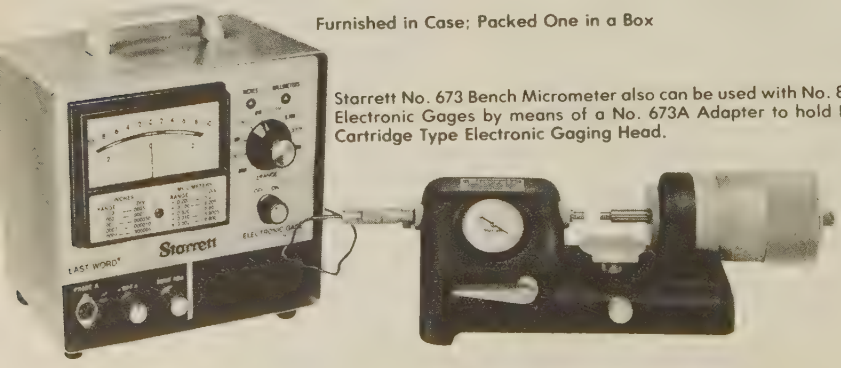
Another useful feature is an adjustable work table centered beneath the anvil and spindle. Table diameter is 2 15/64" and vertical adjustment 7/8". Work can be accurately aligned between anvil and spindle by adjusting the table to the proper height and then locking it in position by a screw.

When using the No. 673 Bench Micrometer for direct measuring, the micrometer head is set to zero and the dial indicator is set to zero by the bezel adjustment. Any work piece within the two inch range can then be measured by the micrometer head in ten-thousandths of an inch (.0001"). The indicator must read zero for each measurement. If used as a comparator, first set the head and the indicator to zero as above. Then adjust the micrometer head to the desired dimension to be checked. After retracting the anvil by the retractor lever, work is placed on the table between anvil and spindle and the anvil released so anvil and spindle contact the work. Plus or minus deviation from the nominal work size is then read from the dial indicator in fifty millionths of an inch (.000050").

		Range		Graduation		
Cat. No.	EDP No.	Micrometer Head	Dial Indicator	Micrometer Head	Dial Indicator	Work Table
673Z	52890	0-2"	.006" (0-3-0)	.0001"	.00005"	2 15/64" dia. 7/8" vertical adjustment
673MZ	57101	0-50 mm	0.2 mm (0-10-0)	0.002 mm	0.002 mm	56.8 mm dia. 22.2 mm vertical adjustment
673A	52891	Adapter for No. 812-2 Cartridge Type Electronic Gaging Head for use with No. 812 Series Electronic Gages.				

NOTE: Anvil Pressure Adjustment—8 oz. to 3 lbs.
NOTE: METRIC thimble diameter 77.8 mm. Anvil pressure 0.23 to 1.36 Kg.

Furnished in Case; Packed One in a Box

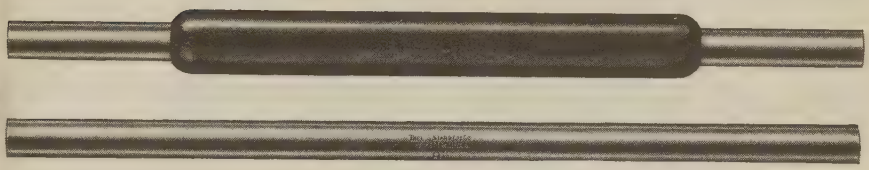


Starrett No. 673 Bench Micrometer also can be used with No. 812 Series Electronic Gages by means of a No. 673A Adapter to hold No. 812-2 Cartridge Type Electronic Gaging Head.

Standard End Measuring Rods With Spherical Ends

No. 234 Series—*1 to 24 Inch*

No. 234M Series—*25 to 600 mm*



No. 234 Standards available with or without insulated handles as shown above.

For checking and setting Starrett Micrometers of 2 inch capacity and larger, and also are used on machine tools, for comparing gages, checking precision measuring tools, for measuring parallel surfaces and many other types of work.

No. 234 Standards are made of special tool steel in rod form with ends hardened and accurately lapped to a spherical radius approximately equal to one half the length of the standard.

Available plain, or with insulated handles to minimize expansion by heat when held in the hand. 1 to 6" sizes are 1/4" diameter; 7 to 11" sizes, 3/8" diameter; 12 to 24" sizes, 7/16" diameter.

Length	With Rubber Handle		Without Rubber Handle	
	Cat. No.	EDP No.	Cat. No.	EDP No.
1"	234A-1	50969	234B-1	51017
2"	234A-2	50971	234B-2	51019
3"	234A-3	50973	234B-3	51021
4"	234A-4	50975	234B-4	51023
5"	234A-5	50977	234B-5	51025
6"	234A-6	50979	234B-6	51027
7"	234A-7	50981	234B-7	51029
8"	234A-8	50983	234B-8	51031
9"	234A-9	50985	234B-9	51033
10"	234A-10	50987	234B-10	51035
11"	234A-11	50989	234B-11	51037
12"	234A-12	50991	234B-12	51039
13"	234A-13	50993	234B-13	51041
14"	234A-14	50995	234B-14	51043
15"	234A-15	50997	234B-15	51045
16"	234A-16	50999	234B-16	51047
17"	234A-17	51001	234B-17	51049
18"	234A-18	51003	234B-18	51051
19"	234A-19	51005	234B-19	51053
20"	234A-20	51007	234B-20	51055
21"	234A-21	51009	234B-21	51057
22"	234A-22	51011	234B-22	51059
23"	234A-23	51013	234B-23	51061
24"	234A-24	51015	234B-24	51063

NOTE: Available with or without Insulated Handle. (Sizes 1"–8" have one insulated handle; sizes 9"–11" have two insulated handles) Furnished with Insulated Handle for No. 239-2 to 6 inch and all tubular micrometers; without Insulated Handle for all other black enameled frame micrometers. [1" Standard (Disc) furnished with all 2" full finish frame micrometers.]

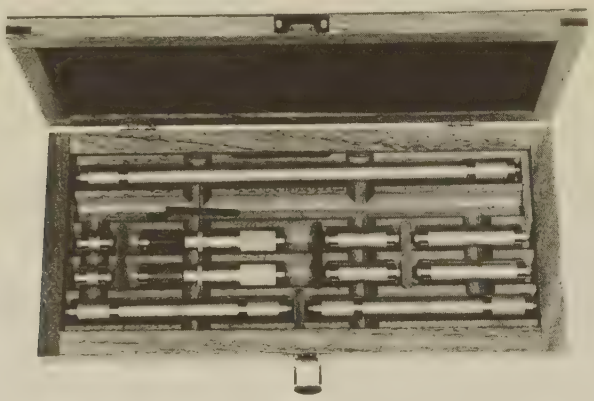
Length	With Rubber Handle		Without Rubber Handle	
	Cat. No.	EDP No.	Cat. No.	EDP No.
25 mm	234MA-25	50970	234MB-25	51018
50 mm	234MA-50	50972	234MB-50	51020
75 mm	234MA-75	50974	234MB-75	51022
100 mm	234MA-100	50976	234MB-100	51024
125 mm	234MA-125	50978	234MB-125	51026
150 mm	234MA-150	50980	234MB-150	51028
175 mm	234MA-175	50982	234MB-175	51030
200 mm	234MA-200	50984	234MB-200	51032
225 mm	234MA-225	50986	234MB-225	51034
250 mm	234MA-250	50988	234MB-250	51036
275 mm	234MA-275	50990	234MB-275	51038
300 mm	234MA-300	50992	234MB-300	51040
325 mm	234MA-325	50994	234MB-325	51042
350 mm	234MA-350	50996	234MB-350	51044
375 mm	234MA-375	50998	234MB-375	51046
400 mm	234MA-400	51000	234MB-400	51048
425 mm	234MA-425	51002	234MB-425	51050
450 mm	234MA-450	51004	234MB-450	51052
475 mm	234MA-475	51006	234MB-475	51054
500 mm	234MA-500	51008	234MB-500	51056
525 mm	234MA-525	51010	234MB-525	51058
550 mm	234MA-550	51012	234MB-550	51060
575 mm	234MA-575	51014	234MB-575	51062
600 mm	234MA-600	51016	234MB-600	51064

NOTE: Larger Sizes to 60 inches long and up also available on special order.

Sizes 1"–23" Packed One in a Box

Size 24" Packed One in a Package

ALSO SEE NO. 244 PRECISION END MEASURING RODS—PAGES 72, 73



Starrett Precision End Measuring Rods are available in sets in finished cases as shown above or separately.

Precision End Measuring Rod Sets

No. 244 Series—*1 to 12 Inch*

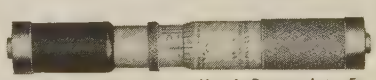
No. 244M Series—*25 to 300mm (Metric)*

STARRETT Precision End Measuring Rod Sets are designed for precision settings on jig borers and other machine tools where spacings and table locations must be held to a high degree of accuracy.

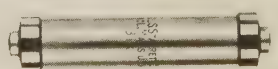
The rods are available in 1, 2, 3, 4, 5, 6, and 12 inch sizes while two micrometer heads with ranges of 4 to 5 inches are also available. Also can be furnished in Metric. The rods and heads can be furnished in complete sets as listed on next page or in any combination to suit specific requirements.

Micrometer heads are graduated to measure in ten-thousandths of an inch. Two heads are available, both identical except one can be furnished with a red identifying ring and the other with black identifying ring. Both have No-Glare SATIN-CHROME Finish for easy reading and corrosion resistance, hardened screws ground from the solid and stabilized, quick reading figures with every thousandth numbered, and lock nut. Contacts are hardened, precision ground and lapped.

The end measuring rods are made of finest tool steel and have raised, concentric sections or collars ⅝ inch diameter which fit in the groove of the machine tool. These raised sections are hardened and precision ground concentric and parallel, and square with the contact faces which are also precision ground and lapped. Like the heads, the rods have SATIN-CHROME Finish.



No. 244 Micrometer Head. Range 4 to 5 inches. Graduated in ten-thousandths of an inch.



No. 244 Rod. 3 inch length shown.

Precision End Measuring Rod Sets

No. 244 Series—*1 to 12 Inch*

No. 244M Series—*25 to 300 mm*

- ★ **For Precision Settings on Jig Borers and Other Machine Tools**
- ★ **Satin-Chrome Finish—No Glare, Resists Rust**
- ★ **Made of Finest Tool Steel**
- ★ **Hardened Contact Surfaces—Precision Ground and Lapped.**
- ★ **Hardened Screw in Micrometer Heads—Ground From The Solid and Stabilized**

Accurate table settings are insured with Starrett precision end measuring rods on this jig borer.

Cat. No. Set	EDP No. Set	No. Heads	Range Heads	Grad. Heads	No. of Rods	Rod Sizes
S244AZ	51144	2	4 to 5"	.0001"	9	2-1", 2-2", 2-3", 2-6", 1-12"
S244BZ	51146	2	4 to 5"	.0001"	10	2-1", 2-2", 2-3", 2-6", 2-12"
S244CZ	51148	2	4 to 5"	.0001"	11	2-1", 2-2", 2-3", 2-6", 3-12"
S244DZ	51149	2	4 to 5"	.0001"	12	2-1", 2-2", 2-3", 2-6", 4-12"
S244MAZ	51145	2	100 to 125 mm	0.01 mm	9	2-25 mm, 2-50 mm, 2-75 mm, 2-150 mm, 1-300 mm
S244MBZ	51147	2	100 to 125 mm	0.01 mm	10	2-25 mm, 2-50 mm, 2-75 mm, 2-150 mm, 2-300 mm

NOTE: All Sets Have Two Heads with Lock Nut, One with Red Identifying Ring and One with Black Identifying Ring.

NOTE: Sets Also Available with Heads and Rods in Any Combination Desired — Prices on Application.

Micrometer Heads

Cat. No.	EDP No.	Range	Graduation	Description
244E	51150	4 to 5"	.0001"	With Lock Nut, With Red Ring
244F	51151	4 to 5"	.0001"	With Lock Nut, With Black Ring
244ME	51152	100 to 125 mm	0.01 mm	With Lock Nut, With Red Ring
244MF	56291	100 to 125 mm	0.01 mm	With Lock Nut, With Black Ring

Rods

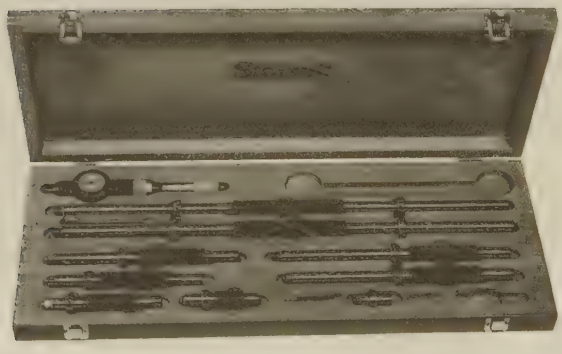
Length	Cat. No.	EDP No.	Length	Cat. No.	EDP No.
1"	**244-1**	51153	25 mm	**244M-25**	51160
2"	**244-2**	51154	50 mm	**244M-50**	51161
3"	**244-3**	51155	75 mm	**244M-75**	51162
4"	**244-4**	51156	100 mm	**244M-100**	51163
5"	**244-5**	51157	125 mm	**244M-125**	51164
6"	**244-6**	51158	150 mm	**244M-150**	51165
12"	**244-12**	51159	300 mm	**244M-300**	51166

All Sets Available in Attractive, Protective Cases; Sent With Case Unless Otherwise Ordered. Packed One in a Box

Inside Micrometers

6 to 294 Inch

No. 128 Series



★ For Inside Measurements from 6″ to 294″—Sizes over 294″ also Available on Special Order
★ SATIN-CHROME Micrometer Head—2″ Movement—Graduated Thousandths of an Inch
★ Hardened Screw in Micrometer Head—Ground from the Solid and Stabilized—Hardened and Ground Anvil
★ Interchangeable, Tubular Steel Measuring Rods and Extension Rods—Light Weight plus Extreme Rigidity—All Marked with Size
★ Adjustable Rod Anvil Contacts—Hardened, Ground, and Lapped
★ Ground Steel Supporting Collars—Adjustable and Removable—Insulating Handles
★ Adaptable for Use with Optical Sights and Other Instruments

HERE'S a new set of Inside Micrometers which are ideal for a wide range of precision inside measurements in aircraft, metal-working, and other industries. Three sets are available in 6″ to 78″, 6″ to 150″, and 6″ to 294″ sizes and greater ranges are available on special order.

Each set consists of a SATIN-CHROME Micrometer Head which can be used in combination with any one or more of a series of rigid, tubular steel measuring rods to obtain the required length. The head has a basic length of 4″ which can be lengthened to 6″ by means of its 2″ adjustment in thousandths of an inch. A combination head described on next page also available on special order. Measuring rods are each marked with size and are furnished in 2″, 4″, 6″, 8″, 10″, 12″ sizes, plus 12″ and 24″ extension rods, and are interchangeable for various combinations of total length. The rods screw into each other by a threaded connection and precisely seat against hardened, ground and lapped surfaces for highly accurate overall length. Each set is equipped with suitable wrenches for assembling the rods. Rod anvil contacts are hardened, ground, and lapped and are adjustable.

Adjustable, ground steel supporting collars are provided to maintain accuracy when the inside micrometer is used in the horizontal position and in such cases should be fully supported by the collars in "V" grooves. Rods are also provided with insulating handles which minimize possible expansion by heat when held in the hand.

All sets listed next page are each furnished in finely finished hardwood cases.

Inside Micrometers—No. 128 Series

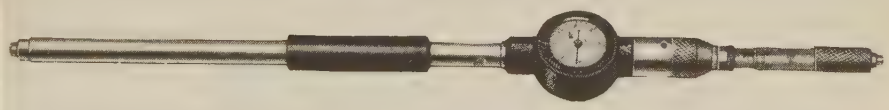
Cat. No.	Range With Micrometer Head	Movement of Screw	Description	Range With Combination Head*
128AZ	6 to 78″	2″	With (1) 4″-6″ Head, (1) each 2″, 4″, 6″, 8″, 10″, 12″ Rods, (1) 12″ Ext., (2) 24″ Ext.	11 to 83″
128BZ	6 to 150″	2″	With (1) 4″-6″ Head, (1) each 2″, 4″, 6″, 8″, 10″, 12″ Rods, (1) 12″ Ext., (5) 24″ Ext.	11 to 155″
128CZ	6 to 294″	2″	With (1) 4″-6″ Head, (1) each 2″, 4″, 6″, 8″, 10″, 12″ Rods, (1) 12″ Ext., (11) 24″ Ext.	11 to 299″

PRICES ON APPLICATION

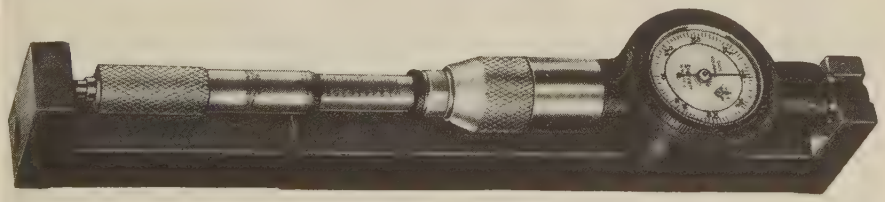
*NOTE: Combination Head available on Special Order. See below.
NOTE: Larger Sizes also Available.
All Sets Furnished in Finished Wood Cases
Packed One in a Box

*Combination Head for Inside Measurements**

AVAILABLE ON SPECIAL ORDER



No. 128 shown with Combination Head in place of Micrometer Head. Master also available as shown below.

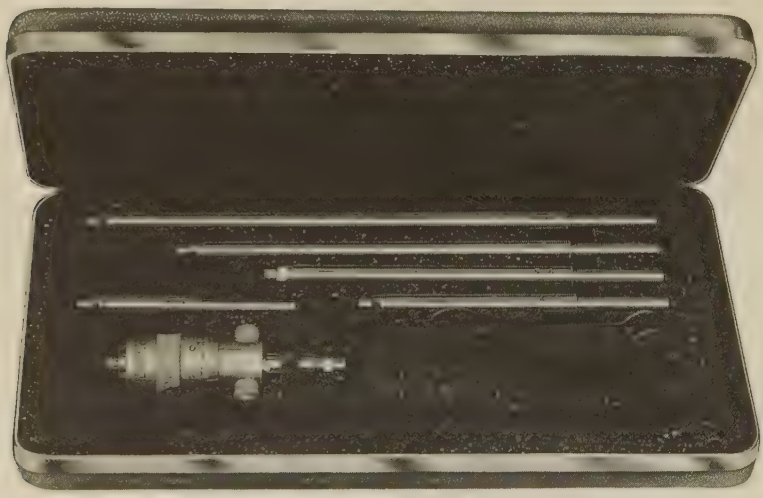


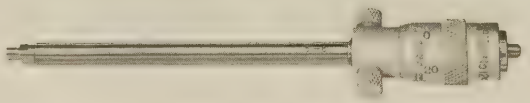
THE STARRETT Combination Head for Inside Measurements combines the precision of the Dial Indicator Sensor and the linear range accuracy of the Micrometer. This combination of Indicator and Micrometer reduces the problem of operator feel and provides faster readings with increased reliability.

This Head is designed for functional interchangeability with Starrett No. 128 Series End Rods and Extension combinations.

For direct measurements, the dial indicator hand and the tell-tale hand must both register zero before reading the micrometer. As a comparator, the micrometer is first set to the nominal dimension and plus or minus deviation from zero is read from the dial indicator. The gage should be rocked to obtain a minimum reading on the indicator. Out-of-roundness also can be checked, any variation being shown by the indicator.

The head can be adjusted within a range of 2″ and extends the overall range of the No. 128 Inside Micrometer an additional five inches. The special No. 81–138 Jeweled Non-Shock Dial Indicator is graduated .0005″, range ±.040″ and reads 0 to 40 on both the plus and minus dials.





Inside Micrometers

No. 124 Series—*2 to 32 Inch* **No. 124M Series**—*50 to 800mm (Metric)*

THE STARRETT No. 124 SATIN-CHROME Inside Micrometer is another popular and very useful adjustable end measuring gage for measuring inside diameters of cylinders, rings, etc., measuring parallel surfaces, and for setting calipers, comparing gages, etc.

No. 124 Inside Micrometers are available in four different sizes (also Metric) with an overall range from 2 inches up to 32 inches inclusive as listed on the next page. No. 124A and No. 124B heads have ½ inch movement and the No. 124C head 1 inch movement. Heads have No-Glare, rust-resisting, SATIN-CHROME Finish. Threads are hardened, ground from the solid and stabilized. All heads have Quick Reading graduations in thousandths of an inch with thousandths lines numbered.

The desired range is obtained by assembling measuring rods and lapped gages or spacing collars to the micrometer head. Measuring rods are provided with a shoulder, against which the rods are set accurately in the micrometer head and locked in final position. The "O" mark on the rod (excepting the 2-3 inch rod) should be lined up with the "O" mark on the end of the micrometer head. Increased size ranges can be obtained if desired by assembling the spacing collar or gage on the rod between the head and rod shoulder.

Measuring rods are solid. Each rod has individual length adjustment for the anvil by means of special wrenches furnished and all contact surfaces on both the rod and head anvils are hardened and ground. Quick, easy adjustment for taking up wear in the micrometer screw is also provided.

If desired, a convenient handle 6½" long (extra when specified) can be furnished with No. 124A, B and D Micrometers for insertion in the head in place of the knurled screw opposite the grooved rod-lock screw.

Inside Micrometers

2 to 32 Inch

50 to 800mm (Metric)

No. 124 Series

- ★ **SATIN-CHROME Finish on Heads—No Glare, Resists Rust**
- ★ **Each Rod Marked with Length**
- ★ **Hardened and Ground Anvils on Rods, Adjustable for Length—Head Anvil Hardened and Ground**
- ★ **One Piece Screw—with Hardened Threads Ground from the Solid and Stabilized**
- ★ **Quick Reading Figures—Every Thousandth Numbered**
- ★ **Quick, Easy Adjustment for Micrometer Screw**
- ★ **Convenient Handle Available on No. 124A, B and D Micrometers—Provides Reach for Use in Deep Holes**

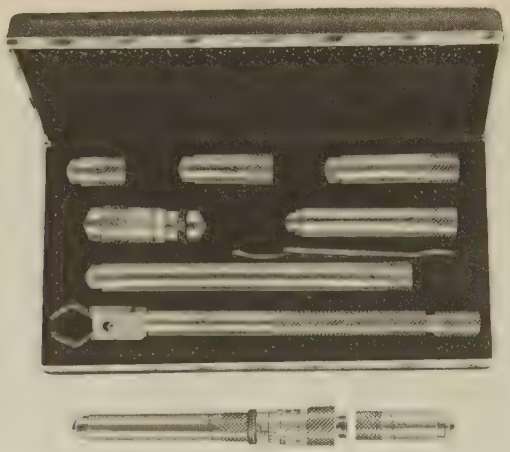
The large diameter in this big flywheel is accurately measured with a Starrett No. 124 Inside Micrometer.

Cat. No.	EDP No.	Range	Graduation	Movement of Screw	No. Measuring Rods	No. Gages	Case
124A 124AZ	50540 50542	2 to 8"	.001"	1/2"	6	One ½" Gage	Without Case In Case
124B 124BZ	50544 50546	2 to 12"	.001"	1/2"	10	One ½" Gage	Without Case In Case
124C 124CZ	50548 50550	8 to 32"	.001"	1"	4	One 1" and Two 2" Gages	Without Case In Case
124D 124DZ	50552 50554	2 to 32"	.001"	½" & 1" (2 heads)	Comprises Set Nos. 124A and 124C		Without Case In Case
124MA 124MAZ	50541 56141	50 to 200 mm	0.01 mm	13 mm	6	One 12 mm Gage	Without Case In Case
124MB 124MBZ	50545 56142	50 to 300 mm	0.01 mm	13 mm	10	One 12 mm Gage	Without Case In Case
124MC 124MCZ	50549 56143	200 to 800 mm	0.01 mm	25 mm	4	One 25 mm and Two 50 mm Gages	Without Case In Case
124MD 124MDZ	50553 56144	50 to 800 mm	0.01 mm	13 & 25 mm (2 heads)	Comprises Set Nos. 124MA and 124MC		Without Case In Case

NOTE: No. 124H (EDP No. 50556) Handle can also be furnished for No. 124A, No. 124B, No. 124D, No. 124MA, No. 124MB and No. 124MD.

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered

Packed One in a Box



The Starrett No. 823A Tubular Inside Micrometer is illustrated above. Range 1½ to 8". Other sizes with capacity up to 40" also available. Furnished in case at no extra charge.

Tubular Inside Micrometers

1½ to 40 Inch

40–1000mm (Metric)

No. 823 Series

THIS Starrett Inside Micrometer has SATIN-CHROME Finish on the head—eliminates glare, retards corrosion and increases speed and accuracy of readings. Markings stand out sharp and clear under any illumination.

A highly useful tool for internal linear measurements such as measuring cylinders, rings, setting calipers, comparing gages, and measuring parallel surfaces. Available in six sizes which will measure down to 1½ inches minimum and with extension rods up to 40 inches maximum inclusive. (Also Metric) Threads are hardened, stabilized and ground from the solid. Micrometer heads have ½ inch or 1 inch movement depending on the micrometer size, and Quick Reading graduations in thousandths of an inch with all thousandths lines numbered.

The extension rods are made of steel tubing, centerless ground, and are light weight yet extremely rigid. Rods are approximately ⅜ inch diameter to meet the requirements of mechanics who prefer this larger diameter. By removing the hardened and ground anvil ends (end caps) of the micrometer head, the rods may be attached to either or both ends of the micrometer as preferred, for the best balance, feel and easy reading. Each rod is marked with the length and may be individually adjusted for wear by the hardened and ground anvil at the end.

This convenient handle 5½" long provides perfect reach and balance since it can be easily attached at the best position anywhere along the heads or rods.

A positive adjustment for wear of the micrometer head or for sense of feel is made through the Starrett friction sleeve by a spanner wrench that is furnished with each set. A handle, 5½" long, furnished with No. 823A, B and F Sets, may be clamped to the knurled sections or anywhere along the smooth section of the head or rods to provide the correct reach and balance.

Tubular Inside Micrometers

No. 823 Series—*1½ to 40 Inch*

No. 823M Series—*40 to 1000 mm (Metric)*

- ★ SATIN-CHROME Finish on Head—No Glare, Resists Rust
- ★ Tubular Measuring Rods—Light Weight plus Extreme Rigidity
- ★ Rods Attachable to Either or Both Ends of Head—Insures the Best Balance, Feel and Ease of Reading
- ★ Each Rod Marked with Length
- ★ Hardened and Ground Anvils on Rods, Adjustable for Length—Head Anvil Hardened and Ground
- ★ One Piece Screw—With Hardened Threads Ground from the Solid and Stabilized
- ★ Quick Reading Figures—Every Thousandth Numbered
- ★ Quick, Easy Adjustment
- ★ Lock Nut Furnished on One-inch Heads
- ★ Convenient Handle Furnished on A, B, F Micrometers—Provides Correct Reach and Balance
- ★ Interchangeable Anvils on Both ½" and 1" Heads

Checking the inside diameter of a deep hole in a housing with a Starrett No. 823 Inside Micrometer. Note the convenient handle attached to the center of the micrometer.

Cat. No.	EDP No.	Range	Movement of Screw	Description
		Graduation—.001"		
823AZ	53050	1½ to 8"	½"	With 5 measuring rods and handle
823BZ	53052	1½ to 12"	½"	With 8 measuring rods and handle
823CZ	53054	4 to 24"	1"*	With 7 measuring rods
823DZ	53055	4 to 32"	1"*	With 8 measuring rods
823EZ	53056	4 to 40"	1"*	With 10 measuring rods
823FZ	53058	1½ to 32"	½ and 1"* (2 heads)	With 10 measuring rods and handle
		Graduation—0.01 mm		
823MAZ	53051	40 to 200 mm	13 mm	With 6 measuring rods and handle
823MBZ	53053	40 to 300 mm	13 mm	With 8 measuring rods and handle
823MEZ	53057	100 to 1000 mm	25 mm*	With 10 measuring rods

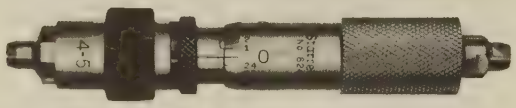
*NOTE: 1" and 25 mm heads furnished with lock nut

Each Set Furnished in Attractive, Protective Case

Packed One in a Box

Fixed Range Inside Micrometers

824 Series—*2 to 12 Inch*



824B — 4-5 Inch

824C — 5-6 Inch

824D — 6-7 Inch

For those who prefer inside micrometers without interchangeable rods, Starrett offers a series of fixed range inside micrometers. Thirteen individual micrometers are offered in ranges covering 2 to 12 inches. Four complete sets are also available offering ranges of 2 to 6 inches, 2 to 12 inches and 6 to 12 inches. All 824 series micrometers feature no glare satin chrome finish and lock nuts (except 824AA). Spindle threads are hardened, ground from the solid and stabilized. Insulating handles on all sizes minimize possible expansion by heat when hand held. All sets are furnished in an attractive, protective case.

SPECIFICATIONS:

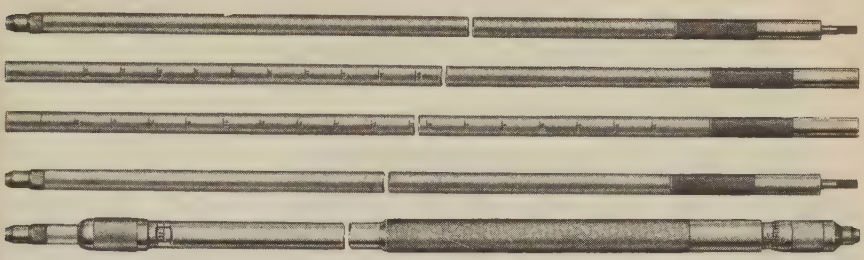
Cat. No.	EDP No.	Range	Movement of Screw
824AA	56665	2 to 3"	1"
824A	56666	3 to 4"	1"
824B	56667	4 to 5"	1"
824C	56668	5 to 6"	1"
824D	56669	6 to 7"	1"
824E	56670	7 to 8"	1"
824F	56671	8 to 9"	1"
824G	56672	9 to 10"	1"
824H	56673	10 to 11"	1"
824J	56674	11 to 12"	1"
824K	56675	6 to 8"	2"
824L	56676	8 to 10"	2"
824N	56677	10 to 12"	2"

Packed One in a Box

SPECIFICATIONS SETS:

Cat. No.	EDP No.	Total Range	Description
S824AZ	56678	2 to 6"	with 4 micrometers, 1" range 2 to 3", 3 to 4", 4 to 5", 5 to 6"
S824BZ	56679	2 to 12"	with 10 micrometers, 1" range 2 to 3", 3 to 4", 4 to 5", 5 to 6", 6 to 7", 7 to 8", 8 to 9", 9 to 10", 10 to 11", 11 to 12"
S824CZ	56680	6 to 12"	with 3 micrometers, 2" range 6 to 8", 8 to 10", 10 to 12"
S824DZ	56681	2 to 12"	with 7 micrometers 4 with 1" range 3 with 2" range 2 to 3", 3 to 4", 4 to 5", 5 to 6", 6 to 8", 8 to 10", 10 to 12"

Each Set Furnished in Attractive, Protective Case
Packed One Set Per Case



The Starrett No. 121C Tubular Inside Micrometer is shown above. Overall range is 32 to 107 inches in thousandths of an inch. Set is furnished complete in finished case not shown. Other sizes, range 32"–57" and 32"–82", also available as listed below.

Tubular Inside Micrometers

32 to 107 Inch

No. 121 Series

STARRETT No. 121 Tubular Inside Micrometers are designed for large internal measurements beyond the capacity of other micrometers. Each set consists of a micrometer head mounted at the end of a hollow holder in which measuring rods can be inserted and adjusted to the desired size. Final size reading in thousandths of an inch is obtained using the micrometer head. Rods and holder telescope within each other and are made of steel tubing, light in weight yet very rigid. Each rod is accurately graduated with inch divisions, which are set to the size desired by a line on the holder, and firmly held by a large knurled clamping nut. The collet has new improved design with a double taper, insuring extremely tight grip on the rods at any setting. The anvils are hardened and the rod anvils are adjustable for wear. The micrometer head on the end of the holder has a 1-inch movement and is graduated in thousandths. Combinations are possible which give a range of 32 to 107 inches with micrometer accuracy over the entire range.

- ★ **Attractive Nickel Plated Finish; SATIN-CHROME Finish on Micrometer Head Reading Surfaces**
- ★ **Telescoping Tubular Holder and Measuring Rods—Light Weight plus Extreme Rigidity**
- ★ **Rods Accurately Graduated in Inches—Micrometer Head in Thousandths of an Inch**
- ★ **Adjustable, Hardened and Ground Anvils**
- ★ **One Piece Screw—With Hardened Threads Ground from the Solid and Stabilized**
- ★ **Quick, Easy Adjustment for Micrometer Screw**

Cat. No.	EDP No.	Range	Movement of Screw	Description
		Graduation—.001"		
121AZ	50492	32 to 57"	1"	With 1 measuring rod
121BZ	50493	32 to 82"	1"	With 2 measuring rods
121CZ	50494	32 to 107"	1"	With 3 measuring rods

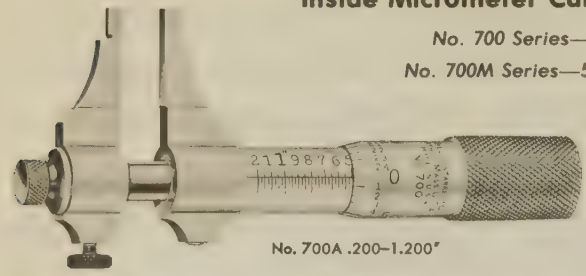
Each Set Furnished in Attractive, Protective Case

Packed One in a Box

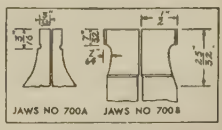
Inside Micrometer Calipers—No. 700 Series

No. 700 Series—.200 to 2 Inches

No. 700M Series—5 to 50 mm (Metric)



No. 700A .200–1.200"



Caliper type jaws permit quick inside measurements with micrometer accuracy. Jaws are hardened and ground on a radius for accurate feel without cramping. Satin chrome finish — no glare, resists rust. Furnished with locking screw.

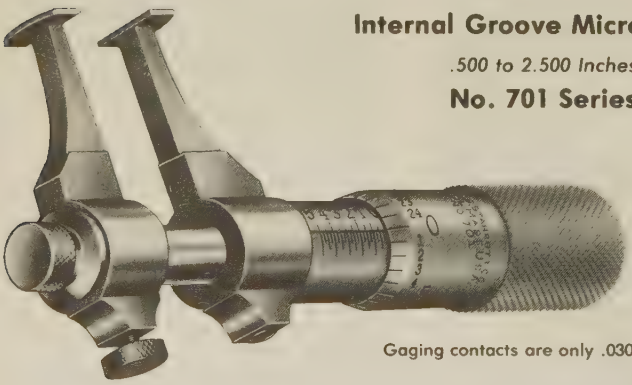
Cat. No.	EDP No.	Range	Graduation	Description
700A	52909	.200 to 1.200"	.001"	With Lock Screw
700MA	56063	5 to 30 mm	0.01 mm	With Lock Screw
700B	52911	1 to 2"	.001"	With Lock Screw
700MB	56064	25 to 50 mm	0.01 mm	With Lock Screw

Available With Attractive Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

Internal Groove Micrometers

.500 to 2.500 Inches

No. 701 Series



Gaging contacts are only .030" thick

Measures grooves for retaining rings and "O" rings, oil grooves, washer grooves, as well as bores and recesses. Hardened and ground gaging contacts are only .030" thick. Contact-jaws can be inserted into any hole to a depth up to ½" (No. 701A) or ⅞" (No. 701B) for measuring groove I.D. Contacts have flush ends to gage grooves at the bottom of blind holes. Depth of grooves up to 5/64" can be measured with No. 701A; 7/32" with No. 701B.

Cat. No.	EDP No.	Range	Graduation	Minimum Bore	Max. Depth Bore	Thickness Jaws	Description
701A	52913	.500 to 1.500"	.001"	.500"	½"	.030"	With Lock Screw
701B	52915	1.500 to 2.500"	.001"	1.500"	⅞"	.030"	With Lock Screw

Available With Attractive Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box

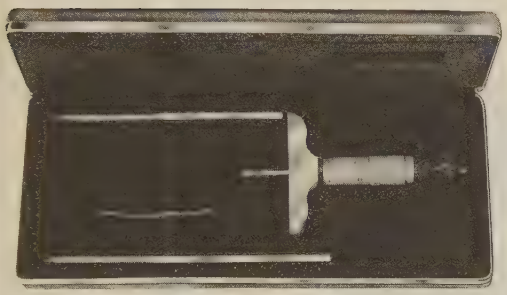
Micrometer Depth Gages

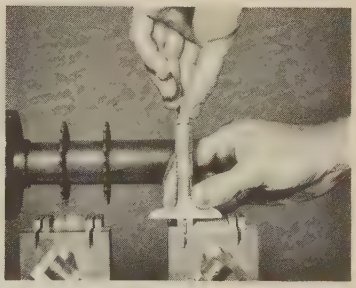
Non-Rotating Blades—*0 to 3 and 0 to 6 Inch*

0 to 75 mm and 0 to 150 mm (Metric)

With 2½ and 4 Inch Bases

No. 449 Series





Measuring depth of narrow slot with No. 449A-3R Micrometer Depth Gage.

Non-rotating, blade-type rods approximately .045" thick x ⅛" wide. By holding the base in one hand, the blade can be turned with the fingers and positioned at any angle relative to the base. The blade does not turn, but moves perpendicularly only, permitting depth measurement of narrow shoulders without the blade rolling off. Great, too, for slots and recesses as narrow as .045". Furnished with 2½" or 4" base and 3 or 6 rods for measuring 0 to 3" or 0 to 6" in thousandths of an inch. The micrometer screw is precision ground and has a 1" movement. Bases and rods are hardened, ground and lapped. Rods have individual length adjustment. Added features include no-glare satin chrome finish and quick-reading graduations.

Cat. No.	EDP No.	Graduation	Range	Base Length	Number of Rods	Rod Size
With Ratchet Stop, No Lock Nut						
449AZ-3R	52318	.001"	0 to 3"	2½"	3	.045" x ⅛"
449AZ-6R	52320		0 to 6"	2½"	6	
449BZ-3R	52322		0 to 3"	4"	3	
449BZ-6R	52324		0 to 6"	4"	6	
449MAZ-75R	56636	0.01 mm	0 to 75 mm	63.5 mm	3	1.2 mm x 3.2 mm
449MAZ-150R	56637		0 to 150 mm	63.5 mm	6	
449MBZ-75R	56638		0 to 75 mm	100 mm	3	
449MBZ-150R	56639		0 to 150 mm	100 mm	6	

Furnished in Case Unless Otherwise Ordered

Packed One in a Box

Rods Only

Size	Part No.	EDP No.	Size	Part No.	EDP No.
0 to 1"	99115	71838	3 to 4"	99118	71841
1 to 2"	99116	71839	4 to 5"	99119	71842
2 to 3"	99117	71840	5 to 6"	99120	71843

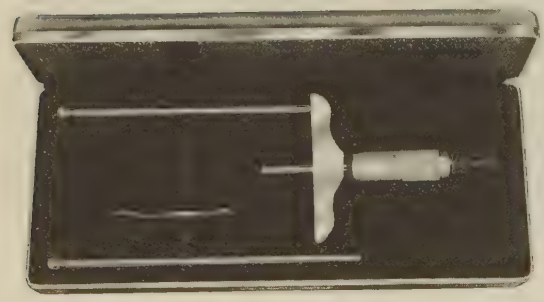
Micrometer Depth Gages

0 to 3, 0 to 6 and 0 to 9 Inch

0 to 75 mm, 0 to 150 mm, and 0 to 225 mm (Metric)

With 2½, 3, 4, 5 and 6 Inch Bases

No. 440 and No. 445 Series



Starrett Micrometer Depth Gages are available in cases. No. 445A-3RL with 3 inch base is illustrated.

The depth of holes, slots, shoulders and projections can be measured to .001" with these fine tools. No. 440 gages are furnished with a 2½" base and No. 445 gages with 3, 4, 5 and 6" bases. Each gage comes in three size ranges, 0 to 3" with 3 rods; 0 to 6" with 6 rods; and 0 to 9" with 9 rods. Both sleeve and thimble have no-glare satin chrome finish. Graduations are quick-reading with every thousandth numbered. The screw is precision ground and has a 1" movement. A lock nut holds the setting at the precise measurement desired. The bases are hardened, ground and lapped for long-lasting precision. Measuring rods have individual length adjustment and are hardened, ground and lapped on the end measuring faces. They are inserted through a hole in the screw and brought to a positive seat by a knurled nut. All gages are furnished in attractive, protective cases.

Measuring the depth of a shoulder with the Starrett No. 445C-3RL Micrometer Depth Gage.

Micrometer Depth Gages

0 to 3, 0 to 6 and 0 to 9 Inch

0 to 75 mm, 0 to 150 mm and 0 to 225 mm (Metric)

With 2½, 3, 4, 5 and 6 Inch Bases

No. 440 and No. 445 Series

continued

Cat. No.	EDP No.	Graduation	Range	Base Length	Number of Rods*	Rod Diameter
Without Ratchet Stop, With Lock Nut, in Case						
440Z-3L	52113	.001"	0 to 3"	2½"	3	1/8"
440Z-6L	52117		0 to 6"		6	
440Z-9L	52121		0 to 9"		9	
440MZ-75L	52114	0.01 mm	0 to 75 mm	63.5 mm	3	3.2 mm
440MZ-150L	52118		0 to 150 mm		6	
440MZ-225L	52122		0 to 225 mm		9	
With Ratchet Stop and Lock Nut, in Case						
440Z-3RL	52115	.001"	0 to 3"	2½"	3	1/8"
440Z-6RL	52119		0 to 6"		6	
440Z-9RL	52123		0 to 9"		9	
445AZ-3RL	52208	.001"	0 to 3"	3"	3	5/32"
445AZ-6RL	52212		0 to 6"		6	
445AZ-9RL	52216		0 to 9"		9	
445BZ-3RL	52220	.001"	0 to 3"	4"	3	5/32"
445BZ-6RL	52224		0 to 6"		6	
445BZ-9RL	52228		0 to 9"		9	
445CZ-3RL	52232	.001"	0 to 3"	5"	3	5/32"
445CZ-6RL	52236		0 to 6"		6	
445CZ-9RL	52240		0 to 9"		9	
445DZ-3RL	52244	.001"	0 to 3"	6"	3	5/32"
445DZ-6RL	52248		0 to 6"		6	
445DZ-9RL	52252		0 to 9"		9	
440MZ-75RL	52116	0.01 mm	0 to 75 mm	63.5 mm	3	3.2 mm
440MZ-150RL	52120		0 to 150 mm		6	
440MZ-225RL	52124		0 to 225 mm		9	
445MAZ-75RL	52209	0.01 mm	0 to 75 mm	75 mm	3	4 mm
445MAZ-150RL	52213		0 to 150 mm		6	
445MAZ-225RL	52217		0 to 225 mm		9	
445MBZ-75RL	52221	0.01 mm	0 to 75 mm	100 mm	3	4 mm
445MBZ-150RL	52225		0 to 150 mm		6	
445MBZ-225RL	52229		0 to 225 mm		9	
445MCZ-75RL	52233	0.01 mm	0 to 75 mm	125 mm	3	4 mm
445MCZ-150RL	52237		0 to 150 mm		6	
445MCZ-225RL	52241		0 to 225 mm		9	
445MDZ-75RL	52245	0.01 mm	0 to 75 mm	150 mm	3	4 mm
445MDZ-150RL	52249		0 to 150 mm		6	
445MDZ-225RL	52253		0 to 225 mm		9	

*For information on Rods Only, see next page.

Furnished in Case Unless Otherwise Ordered

Packed One in a Box

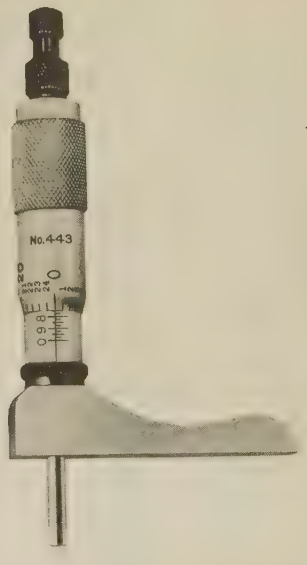
(Continued on next page)

Micrometer Depth Gages

2" Half Base, 5/32" Rod Diameter

No. 443 Series

.001" Graduation, 0 to 9" Range



Half base permits measuring depths of holes, and slots close to shoulders and between obstructions. Quick reading graduations, every thousandth numbered. No-glare satin chrome finish. Rods have individual length adjustment.

With Ratchet Stop and Lock Nut, in Case		Range	No. Rods
Cat. No.	EDP No.		
Graduation—.001"			
443Z-3RL	52171	0 to 3"	3
443Z-6RL	52173	0 to 6"	6
443Z-9RL	52175	0 to 9"	9

Furnished in Case Unless Otherwise Ordered

Packed One in a Box

Rods Only for Micrometer Depth Gages

ENGLISH					METRIC				
Size	No. 440		Nos. 443, 445		Size	No. 440M		No. 445M	
	Part No.	EDP No.	Part No.	EDP No.		Part No.	EDP No.	Part No.	EDP No.
0 to 1"	99331	71973	99341	71982	0 to 25 mm	99361	72193	99371	72202
1 to 2"	99332	71974	99342	71983	25 to 50 mm	99362	72194	99372	72203
2 to 3"	99333	71975	99343	71984	50 to 75 mm	99363	72195	99373	72204
3 to 4"	99334	71976	99344	71985	75 to 100 mm	99364	72196	99374	72205
4 to 5"	99335	71977	99345	71986	100 to 125 mm	99365	72197	99375	72206
5 to 6"	99336	71978	99346	71987	125 to 150 mm	99366	72198	99376	72207
6 to 7"	99337	71979	99347	71988	150 to 175 mm	99367	72199	99377	72208
7 to 8"	99338	71980	99348	71989	175 to 200 mm	99368	72200	99378	72209
8 to 9"	99339	71981	99349	71990	200 to 225 mm	99369	72201	99379	72210

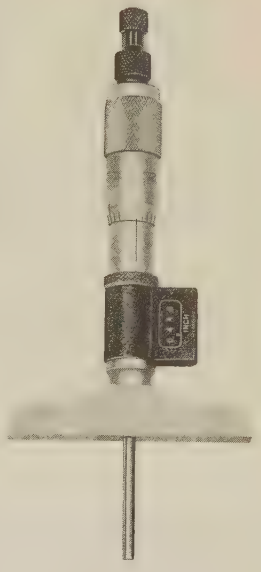
Digital Micrometer Depth Gages

No. 446 Series—*0 to 6"*

No. 446M Series—*0 to 150 mm*

3" Base,

5/32" Rod Diameter



Held and used same as a conventional micrometer depth gage, thousandths of an inch are read directly from the counter—without reference to direction of numbers on a graduated sleeve. Measuring speed is greatly increased since dimensions are read without having to remove fingers from thimble or tool from work. The digital readout displays white numbers on a black background.

With Ratchet Stop, With Lock Nut, in Case		Range	Graduation	No. Rods
Cat. No.	EDP No.			
446AZ-3RL	56288	0 to 3"	.001"	3
446AZ-6RL	56289	0 to 6"	.001"	6
446MAZ-75RL	56294	0 to 75 mm	0.01 mm	3
446MAZ-150RL	56295	0 to 150 mm	0.01 mm	6

Furnished in Case Unless Otherwise Ordered

Packed One in a Box

Rods Only for Digital Micrometer Depth Gages

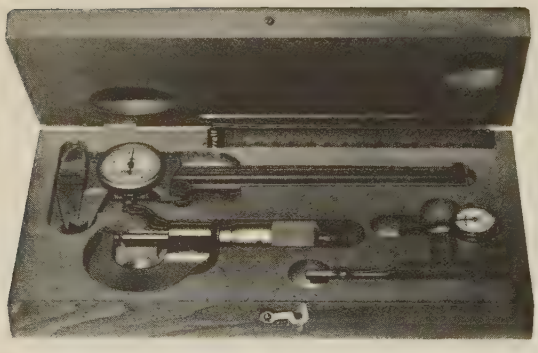
For Series No. 446A			For Series 446MA		
Size	**Part No.**	**EDP No.**	**Size**	**Part No.**	**EDP No.**
0 to 1"	**99381**	72211	0 to 25 mm	**99391**	72217
1 to 2"	**99382**	72212	25 to 50 mm	**99392**	72218
2 to 3"	**99383**	72213	50 to 75 mm	**99393**	72219
3 to 4"	**99384**	72214	75 to 100 mm	**99394**	72220
4 to 5"	**99385**	72215	100 to 125 mm	**99395**	72221
5 to 6"	**99386**	72216	125 to 150 mm	**99396**	72222

Handy Automotive Service Sets No. S917Z English

Every shop doing regrind, rebore, general maintenance and repair needs dependable measuring tools like these. Each set comes in an attractive protective case.

Set No. S917Z (EDP No. 53102) contains No. 224ARL Micrometer with ratchet stop, lock nut and standards; No. 452B Cylinder Gage with locking mechanism; No. 124A Inside Micrometer with handle; and No. 172BT Thickness Gage.

Packed One Set in a Box



Tool Sets English or Metric Series No. S905

In Attractive Protective Cases

These Tool Sets—Plus Series S906 and S907, next page—were developed for industrial use. They contain the tools basic to thousands of everyday length, width, thickness and diameter measurement.

(S905MZ shown)

Contents English

No. S905Z EDP No. 56662

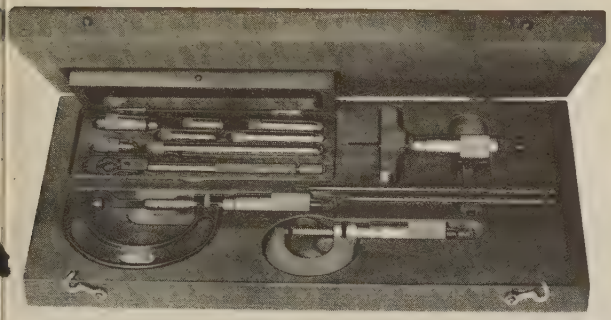
1—**C604RE-6** Spring Tempered Steel Rule
1—**216RL-1** Digital Micrometer
1—**120-6** Dial Caliper
1—**711FSA** Last Word Dial Indicator w/o Case
1—Attractive Case

Contents Metric

No. S905MZ EDP No. 56224

1—**C635E-150** Spring Tempered Steel Rule
1—**216MRL-25** Digital Micrometer
1—**120M-150** Dial Caliper
1—**711MFS** Last Word Dial Indicator w/o Case
1—Attractive Case

Packed One Set in a Box



Tool Sets English or Metric Series No. S906

In Attractive Protective Cases

Contents English

No. S906Z EDP No. 56663

1—**T230XRL** Micrometer
1—**436RL-2** Micrometer
1—**445A-3RL** Micrometer Depth Gage w/o Case
1—**823A** Tubular Inside Micrometer
1—Attractive Case

Contents Metric

No. 906MZ EDP No. 56223

1—**V230MXRL** Micrometer
1—**436MRL-50** Micrometer
1—**445MA-75RL** Micrometer Depth Gage w/o Case
1—**823MA** Tubular Inside Micrometer
1—Attractive Case

Packed One Set in a Box

Tool Sets English or Metric Series No. 907

In Attractive Protective Cases

Contents English

No. S907Z EDP No. 56664

1—**C604RE-6** Spring Tempered Steel Rule
1—**C391** Center Gage
1—**11H-12-4R** Combination Square
1—**230RL** Micrometer
1—**823A** Tubular Inside Micrometer
1—**120-6** Dial Caliper
1—**196B1** Universal Dial Test Indicator
1—Attractive Case

Contents Metric

No. S907MZ EDP No. 56224

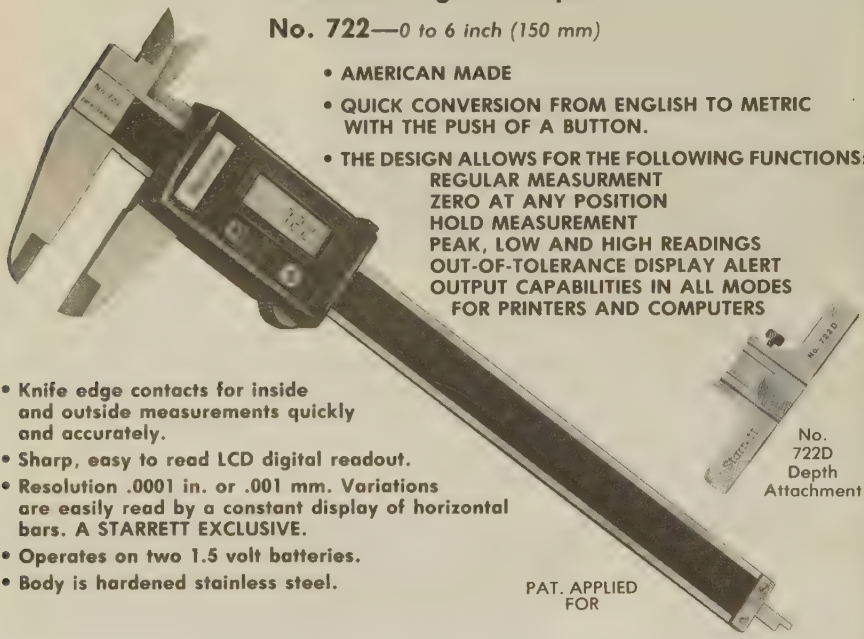
1—**C635E-150** Spring Tempered Steel Rule
1—**C398M** Center Gage
1—**11MEH-300** Combination Square
1—**230MRL** Micrometer
1—**823MA** Tubular Inside Micrometer
1—**120M-150** Dial Caliper
1—**196MB** Universal Dial Test Indicator
1—Attractive Case

Packed One Set in a Box

Electronic Digital Caliper

No. 722—*0 to 6 inch (150 mm)*

- **AMERICAN MADE**
- **QUICK CONVERSION FROM ENGLISH TO METRIC WITH THE PUSH OF A BUTTON.**
- **THE DESIGN ALLOWS FOR THE FOLLOWING FUNCTIONS:**
  REGULAR MEASURMENT
  ZERO AT ANY POSITION
  HOLD MEASUREMENT
  PEAK, LOW AND HIGH READINGS
  OUT-OF-TOLERANCE DISPLAY ALERT
  OUTPUT CAPABILITIES IN ALL MODES FOR PRINTERS AND COMPUTERS



- **Knife edge contacts for inside and outside measurements quickly and accurately.**
- **Sharp, easy to read LCD digital readout.**
- **Resolution .0001 in. or .001 mm. Variations are easily read by a constant display of horizontal bars. A STARRETT EXCLUSIVE.**
- **Operates on two 1.5 volt batteries.**
- **Body is hardened stainless steel.**

PAT. APPLIED FOR

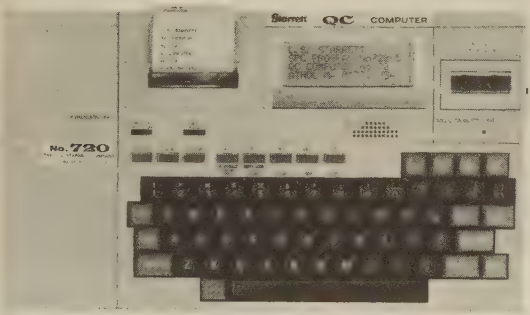
No. 722D Depth Attachment

The new Starrett digital caliper No. 722 is designed to be easy to use, but with newly developed sophisticated features. The exclusive horizontal bars for easy reading of fine increments. Accuracy ±.001 in. or ±.025 mm. An outlet jack on the 722 makes it possible to transmit data directly to accessory equipment to make hard copy printout of your readings or to a data logging device for later statistical analysis. In addition to a printer, this data can be directly received by a computer to perform analysis or to keep a history log. With the addition of No. 722D Depth Attachment the No. 722 becomes an instant depth gage.

Cat. No.	EDP	Size	Description
722Z-6/150 mm	57065	6"–150 mm	Electronic Caliper with case
722-6/150 mm	57066		Electronic Caliper w/o case
722D	57068	—	Depth attachment
722ZZ	57070	—	Case only

NOTE: Replacement Batteries: Union Carbide No. 386, Rayovac No. 386-1.

QC Computer
No. 720



- **Compact— 14⅜ x 8½ x 1⅜ in.**
- **Lightweight— 4.5 lbs.**
- **Battery Operated**
- **Standard Keyboard**
- **Liquid Crystal Screen**
- **Printer**
- **Time and Calendar Program**
- **Microcassette Capabilities**
- **Programmable**

With the Starrett No. 720 QC Computer, you get state-of-the-art technology with microcassette capabilities as a standard feature.

The No. 720 has a full size standard keyboard, liquid crystal screen with 20 x 4 character display. Built-in microprinter—prints out 2¼ in. charts, graphs or text for a permanent hard copy.

Memory: 32 Kilobytes of ROM and 32 Kilobytes of RAM .

Input: 5 serial instrument interface.

Output: Serial communications to host computers.

Power: Battery operated, full 50 hours per charge. (Battery charger included.)

No. 720-5 Starrett SPC Program features:

Output readings
$\bar{x}$ and R Charts
$\bar{x}$ and Sigma Charts
Histogram
Frequency Distribution Table
Process Capability Data such as CP, CR and CPK
Last Word in Friendly Software

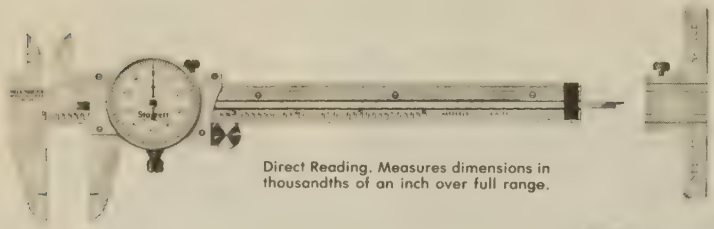
Cat. No.	EDP	Description
720	57089	QC Computer with Battery Charger, Blank Microcassette, SPC Microcassette, Ribbon Cartridge, Roll Paper and Carrying Case

ACCESSORIES

720-1	57090	Cable, Computer to No. 722 Caliper
720-2	57091	Cable, Computer to No. 812 Digital Indicator
720-3	57092	Foot Switch to activate computer input
720-4	57093	Microcassette, Blank
720-5	57094	Microcassette, Starrett SPC Program
720-6	57095	Ribbon Cartridge
720-7	57096	Roll Paper (Package of 5 Rolls)

Dial Caliper (American Made)

No. 120—*0 to 6 Inch, 0 to 12 Inch* **No. 120M**—*0 to 150 mm (Metric)*



Direct Reading. Measures dimensions in thousandths of an inch over full range.

No. 120D Depth Attachment

- ★ **Knife Edge Contacts for Inside and Outside Measurements**
- ★ **Useful for Scribing Lines Parallel to Work Edges**
- ★ **One-Hand Use with Thumb-Operated Fine Adjusting Roll**
- ★ **Hardened Stainless Steel Rack for Lasting Accuracy**
- ★ **Positive Split Gear Anti-Backlash Control**
- ★ **Ideal Depth Gage with No. 120D Depth Attachment**

American made in a full six inch range, this four-way dial caliper has knife edge contacts for inside and outside measurements, and a rod connected to its slide for obtaining depth dimensions. The rod contact is cut out to provide a nib for gaging small grooves and recesses. Depth rod not available on twelve inch size.

Measuring the depth of a shoulder with the Starrett No. 120D Depth Attachment.

By placing the front end of the reverse side of the movable jaw against the edge of a work piece, parallel lines may be scribed against the front end of the fixed jaw. The movable jaw is set to the required measurement by setting the bar and dial to the proper reading. After setting, the movable jaw should be clamped in position with its lock screw.

All readings are taken directly from the bar and dial indicator. Measurements may be made with one hand, a thumb roll being provided for fine adjustment. Knurled thumb screws lock the movable jaw and adjustable indicator dial at any setting.

With the addition of No. 120D Depth Attachment, the No. 120 becomes a direct reading depth gage.

Made of hardened stainless steel, with sharp black bar graduations on a no-glare satin background, No. 120 is built for long service life. It has a hardened, ground and stabilized stainless steel rack with teeth pointing downward to shed foreign matter, and a positive split gear anti-backlash control.

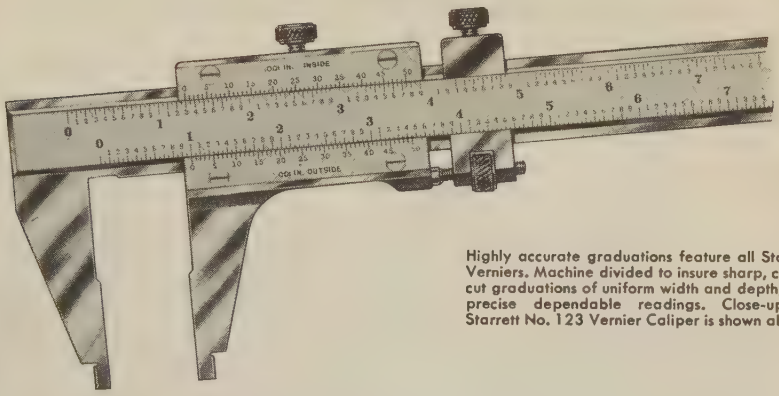
Size	Overall Length, Jaws Closed	Bar Dimensions Width	Bar Dimensions Thickness	Approximate Jaw Depth Outside	Approximate Jaw Depth Inside
6"	9"	5/8"	1/8"	1-1/2"	5/8"
12"	15-13/16"	25/32"	11/64"	2-1/2"	3/4"

Cat. No.	EDP No.	Size	Bar Graduation	Dial Indicator Graduation	Dial Indicator Range per Rev.	Case
120Z-6 120-6	55951 55950	6"	.100"	.001"	.100"	In Case Without Case
120MZ-150 120M-150 120ZZ-6	55977 55976 55971	150 mm	2 mm	0.02 mm	2 mm	In Case Without Case
		Case Only, For 6" and 150 mm Sizes				
120D	56656	Depth Attachment, slot width 5/8", slot depth 1/8". For above sizes only.				
120Z-12 120-12 120ZZ-12	56693 56694 56695	12"	.100"	.001"	.100"	In Case Without Case
		Case Only, For 12" Size				

Sent With Case Unless Otherwise Ordered
Packed One in a Box

Starrett Precision Vernier Tools

Hardened



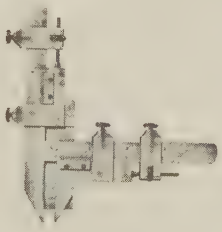
Highly accurate graduations feature all Starrett Verniers. Machine divided to insure sharp, clean-cut graduations of uniform width and depth, and precise dependable readings. Close-up of Starrett No. 123 Vernier Caliper is shown above.

THE Starrett line of Precision Vernier Tools provides a wide range of outstanding tools for precise measuring in thousandths of an inch by the Vernier method. (Except Vernier Protractors which read in degrees and minutes) These include Starrett Vernier Calipers, Vernier Gear Tooth Calipers, Vernier Height Gages, Vernier Depth Gages and Vernier Protractors in both English and Metric Measure—all made with quality workmanship throughout to rigid Starrett standards. For complete listings of Starrett Vernier Tools, see the index in the appendix of this catalog.

All Starrett Vernier Tools are made of the finest tool steel and have hardened bars to insure long life and lasting precision. Measuring surfaces are hardened, ground and lapped to close limits. Accurate readings and settings are insured by a special machine dividing process that produces exceptionally sharp and clean-cut graduations of uniform width and depth—an essential feature for correct matching of graduations on bar or scale with those on the Vernier plate. Vernier slides are fitted tightly to prevent any errors which might be caused by looseness, but still have smooth movement for easy adjustment.

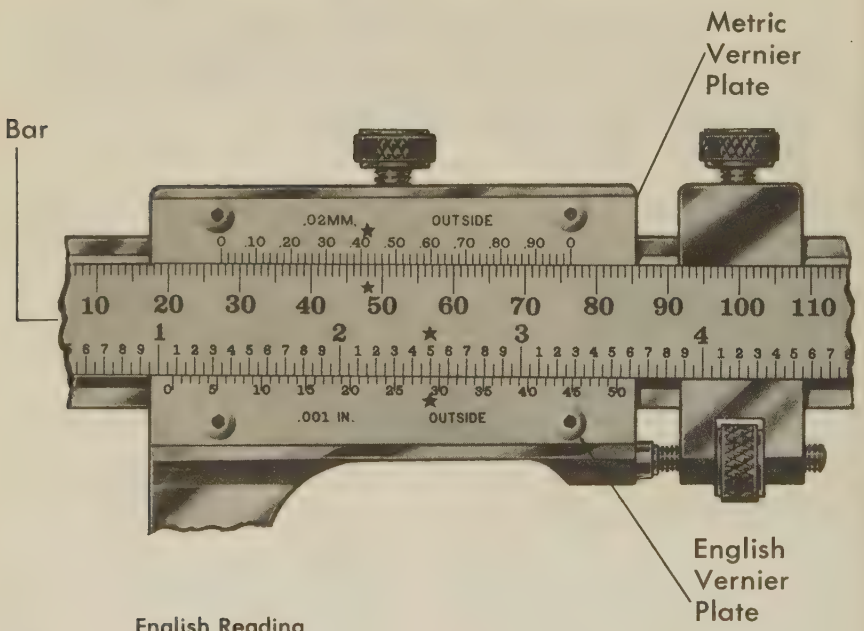
- ★ **Hardened Bars—Insure Long Tool Life**
- ★ **Hardened, Ground and Lapped Measuring Surfaces—for Lasting Precision**
- ★ **Sharp, Clean-Cut Graduations—Machine Divided for Uniform Width and Depth—Insures Accurate Settings and Readings**
- ★ **Tight, Smoothly Fitted Slides—for Maximum Accuracy, Easy Adjustment**
- ★ **Made to Rigid Starrett Standards—Highest Quality Tool Steel and Workmanship Throughout**

STARRETT VERNIER CALIPERS—See pages 96-97



STARRETT VERNIER GEAR TOOTH CALIPERS—See page 112

How to Read a Starrett 50-Division Vernier Gage Graduated in English and Metric (Direct Reading)



English Reading

Refer to the lower bar graduations and the English vernier plate. Inches are numbered in sequence over the full range of the bar. Every second graduation between the inch lines is numbered and equals one-tenth of an inch or .100". Each bar graduation is one-twentieth of an inch or .050".

The vernier plate is graduated in 50 parts, each representing .001". Every fifth line is numbered—5, 10, 15, 20 . . . 45, 50—for easy counting.

To read the gage, first count how many inches, tenths (.100") and twentieths (.050") lie between the zero line on the bar and the zero line on the vernier plate and add them.

Then count the number of graduations on the vernier plate from its zero line to the line that coincides with a line on the bar. Multiply the number of vernier plate graduations you counted times .001" and add this figure to the number of inches, tenths and twentieths you counted on the bar. This is your total reading.

EXAMPLE

In the picture, the vernier plate zero line is one inch (1.000") plus one-twentieth (.050") beyond the zero line on the bar, or 1.050". The 29th graduation on the vernier plate coincides with a line on the bar (as indicated by stars). 29 x .001 (.029") is therefore added to the 1.050" bar reading, and the total reading is 1.079".

Metric Reading

Refer to the upper bar graduations and metric vernier plate. Each bar graduation is 1.00 mm. Every tenth graduation is numbered in sequence—10 mm, 20 mm, 30 mm, 40 mm, etc.—over the full range of the bar. This provides for direct reading in millimeters.

(Continued on next page)

How to Read a Starrett 50-Division Vernier Gage Graduated in English and Metric (Direct Reading) continued

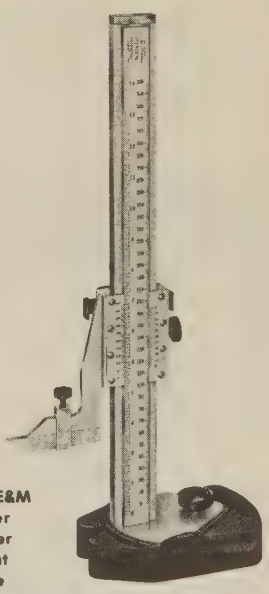
The vernier plate is graduated in 50 parts, each representing 0.02 mm. Every fifth line is numbered in sequence—0.10 mm, 0.20 mm, 0.30 mm . . . 0.80 mm, 0.90 mm—providing for direct reading in hundredths of a millimeter.

To read the gage, first count how many mm lie between the zero line on the bar and the zero line on the vernier plate.

Then find the graduation on the vernier plate that coincides with a line on the bar and note its value in hundredths of a mm. Add the vernier plate reading in hundredths of a mm to the number of mm you counted on the bar. This is your total reading.

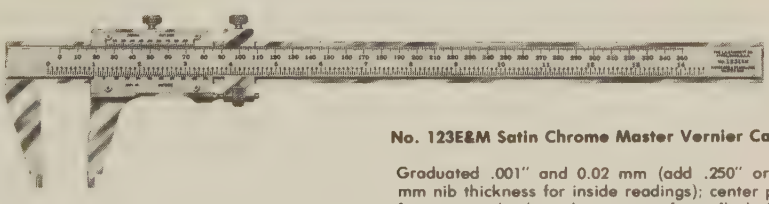
EXAMPLE

In the picture, the vernier plate zero line is 27 mm beyond the zero line on the bar, and the 0.42 mm graduation on the vernier plate coincides with a line on the bar (as indicated by stars). 0.42 mm is therefore added to the 27 mm bar reading, and the total reading is 27.42 mm.



No. 254E&M Master Vernier Height Gage

Graduated .001" and 0.02 mm; fine adjusting knob in base; quick release for fast vertical adjustment; rounded scriber point; long, open face, flush fitting vernier slide; hardened bar; glare-free satin chrome finish.



No. 123E&M Satin Chrome Master Vernier Caliper

Graduated .001" and 0.02 mm (add .250" or 6.35 mm nib thickness for inside readings); center points for setting dividers; long, open face, flush fitting vernier slide; hardened bar; glare-free satin chrome finish.

Caution

When using Starrett Master Vernier Calipers or Height Gages, be sure to remove all of the protective grease from the sides of the graduated bar before moving any sliding members.

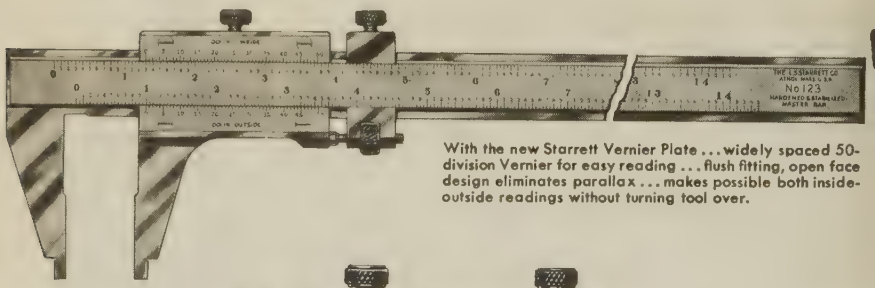
It is important for the bar to be wiped before moving the slide so that all dirt or other particles are removed, thereby preventing possible damage to graduations and interference with operation of the tool.

SATIN CHROME Master Vernier Calipers

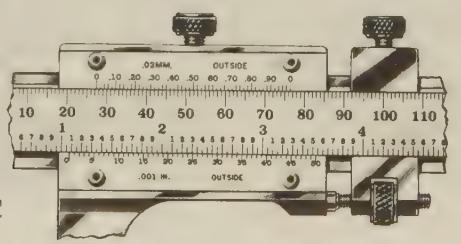
No. 123 Series—*6 Inch to 72 Inch*

No. 123M Series—*150 mm to 600 mm (Metric)*

No. 123E&M Series—*6 Inch or 150 mm to 24 Inch or 600 mm (English and Metric)*



With the new Starrett Vernier Plate . . . widely spaced 50-division Vernier for easy reading . . . flush fitting, open face design eliminates parallax . . . makes possible both inside-outside readings without turning tool over.



Closeup of Vernier on No. 123 E & M Vernier Caliper.

Now, Starrett introduces the ultimate in Vernier gage design—the new No. 123 SATIN CHROME MASTER VERNIER Caliper, featuring greatly improved, easier, faster reading with maximum accuracy, rigidity and long gaging life.

New long 50-division Vernier scales with widely spaced easy-to-read graduations make possible greatly simplified settings and readings without the use of a magnifying glass. This feature permits just half as many bar graduations as conventional single or double Vernier tools, a further asset to fast, accurate readings. Flush fitting of the Vernier scales to the main scale, both in the same plane, eliminates reading errors caused by parallax, and insures exact alignment of matching lines on bar and Vernier.

The open-face design of the Starrett MASTER VERNIER Caliper also makes possible two Vernier scales on one side of the gage for inside and outside measurements, thus allowing both Verniers to be read without turning tool over.

An extremely important feature of this gage is Starrett SATIN CHROME over the entire tool including all reading surfaces. This exclusive finish, pioneered by Starrett, eliminates glare under all shop lighting conditions, makes reading a pleasure instead of an effort. Surfaces are hard chrome plated for resistance to rust and stain. Both bar and Vernier scales are machine divided to highest accuracy.

The master bar, hardened and stabilized for maximum rigidity and long lasting accuracy, features combination straight and angular ways for positive alignment of graduations and easy adjustment of Vernier slide by hand and with fine adjusting nut.

The long length of the adjusting jaw provides a longer bearing surface on the master bar, thereby insuring squareness with the solid jaw and extra resistance to springing.

SATIN CHROME Master Vernier Calipers

No. 123 Series—*6 Inch to 72 Inch*

No. 123M Series—*150 mm to 600 mm (Metric)*

No. 123E&M Series—*6 Inch or 150 mm to 24 Inch or 600 mm (English and Metric)*

Cat. No.	EDP No.	Size	Bar Width	Bar Thickness	Approx. Jaw Depth	Max. Nib Width, Closed	Case
Graduation—.001"							
123Z-6 123-6	50524 50525	6"	11/16"	3/16"	1-9/16"	.250"	In Case Without Case
123Z-12 123-12	50526 50527	12"	15/16"	7/32"	2-5/16"	.300"	In Case Without Case
123Z-24 123-24	50528 50529	24"	15/16"	7/32"	2-5/16"	.300"	In Case Without Case
123Z-36 123-36	50530 50531	36"	1-3/8"	3/8"	3"	.500"	In Case Without Case
123Z-48 123-48	50532 50533	48"	1-3/8"	3/8"	3"	.500"	In Case Without Case
123-60	—	60"*	2-1/2"	3/4"	4-1/2"	.750"	—
123-72	—	72"*	2-1/2"	3/4"	4-1/2"	.750"	—
Graduation—0.02 mm							
123MZ-150 123M-150	56100 56099	150 mm	17.46 mm	4.76 mm	34 mm	6.35 mm	In Case Without Case
123MZ-300 123M-300	56102 56101	300 mm	23.81 mm	5.56 mm	58 mm	7.62 mm	In Case Without Case
123MZ-600 123M-600	56104 56103	600 mm	23.81 mm	5.56 mm	58 mm	7.62 mm	In Case Without Case
Graduation—.001" and 0.02 mm							
123EMZ-6 123EM-6	50534 50535	6" (150 mm)	11/16" (17.46 mm)	3/16" (4.76 mm)	1-9/16" (34 mm)	.250" (6.35 mm)	In Case Without Case
123EMZ-12 123EM-12	50536 50537	12" (300 mm)	15/16" (23.81 mm)	7/32" (5.56 mm)	2-5/16" (58 mm)	.300" (7.62 mm)	In Case Without Case
123EMZ-24 123EM-24	50538 50539	24" (600 mm)	15/16" (23.81 mm)	7/32" (5.56 mm)	2-5/16" (58 mm)	.300" (7.62 mm)	In Case Without Case

NOTE: For Inside Measurements, the thickness of the nibs must be added to the caliper reading as follows:

Catalog Number	Size	Add Nib Thickness Below to Caliper Reading
No. 123E&M	6" or 150 mm	.250 in. (English) or 6.35 mm (Metric)
No. 123E&M	12" or 300 mm	.300 in. (English) or 7.62 mm (Metric)
No. 123E&M	24" or 600 mm	.300 in. (English) or 7.62 mm (Metric)

NOTE: HARDENED BARS on 6", 12" and 24" sizes: these sizes also furnished with Center Points for dividers.

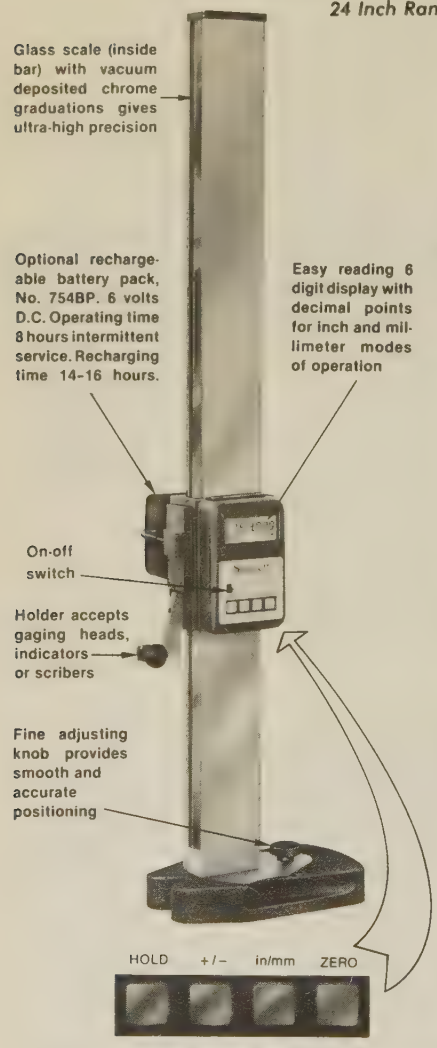
*NOTE: 60, 72 inch sizes and other sizes available on special order: prices on application.

NOTE: Special features will be quoted on application.

Sent With Case Unless Otherwise Ordered
Packed One in a Box

No. 754 Electronic Height Gage

24 Inch Range (600 mm)


Glass scale (inside bar) with vacuum deposited chrome graduations gives ultra-high precision
Optional rechargeable battery pack, No. 754BP. 6 volts D.C. Operating time 8 hours intermittent service. Recharging time 14-16 hours.
Easy reading 6 digit display with decimal points for inch and millimeter modes of operation
On-off switch
Holder accepts gaging heads, indicators or scribers
Fine adjusting knob provides smooth and accurate positioning
HOLD
+/−
in/mm
ZERO

The new 754 ELECTRONIC HEIGHT GAGE features a large, easy-to-read liquid crystal display with resolution to .0001 inch or .001 mm, with an overall accuracy of ±.0002 inch. Readings can be instantly converted to English or metric. Quick adjustments can be accomplished by means of a split nut providing rapid traverse. Ultra fine adjustments are achieved by a knob located in the base. A hold feature allows a reading to be taken in difficult positions, and then the gage may be moved without losing the reading. The zero function permits the gage to float "zero" anywhere within range of the gage. Plus or minus indication allows reading in proper direction. Featured is typical Starrett quality with stress relieved, single column solid bar construction. The hardened vibration proof base, ground and lapped with finger grooves provides ease of movement. Special base allows direct reading from base over full range.

SPECIFICATIONS

	INCH	MILLIMETER
DISPLAY RANGE	±82.5000	±2000
RESOLUTION	.0001	.001
REPEATABILITY	±.0001	±.002
ACCURACY	±.0002	±.005
MAX. MEAS. SPEED	20 in/sec	500 mm/sec
POWER SOURCE	110 Volt A.C. 50/60 HZ	
DIMENSIONS	30.5"H x 5"W x 9"L	
WEIGHT	29 pounds	

ACCESSORIES FURNISHED

DESCRIPTION	PART NO.
POWER SUPPLY	22115
SCRIBER	22187
SCRIBER CARRIER	99205
INDICATOR ADAPTER	812-4
PLASTIC DUST COVER	22183

Cat. No.	EDP No.	Description
754-24	56658	Electronic Height Gage
754ZZ-24	56702	Case Only
754BP	56654	Battery Pack

Packed One Per Box

— OPERATING BUTTONS —

HOLD. The hold button locks the measurement on the display. Movement of the slide will not change the numbers.

+/−. The plus sign on the display will show when the slide is moved upward. The minus sign shows when the slide is moved downward.

in/mm. This pushbutton will convert the display from inch to millimeter and the reverse. This conversion can be done at any position on the bar.

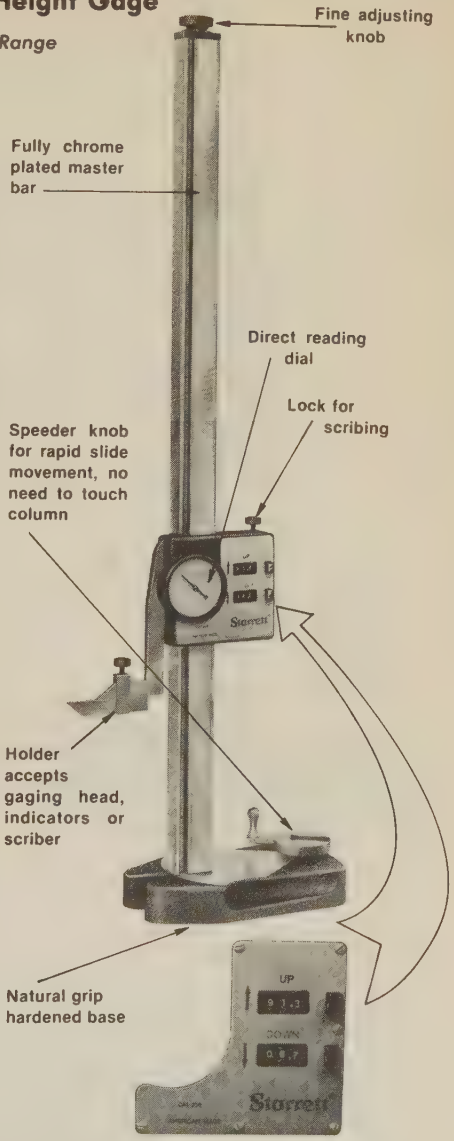
ZERO. When depressed, the display is cleared and a zero condition shows on the display.

No. 259 Dial Height Gage

24 Inch Range

DIRECTLY AND CORRECTLY, is the name of the game with Starrett's new 259 DIAL HEIGHT GAGE. You get .001" accuracy at any point on the column and you get it quickly, and easily because you simply read the counter and dial directly.

A large speeder type knob moves the slide from top to bottom rapidly; a fine adjustment knob located at the top, provides precise settings. You can read the difference in measurements easily by resetting to zero at any point in the range. It locks for easy, accurate scribing or you can mount a dial indicator, depth attachment, electronic probe or other device in the scriber holder. Simple, rugged and well balanced, this gage fits the hands—like all Starrett tools—and it won't fool the eye.



SPECIFICATIONS

MESURING RANGE	0–24 INCHES
RESOUTION:	
DIAL	.001 INCH
DIGITAL COUNTER	.1 INCH
ACCURACY	±.001 INCH
REPEATABILITY	±.0005 INCH
DIMENSIONS	30.5"H x 5"W x 9"L
WEIGHT	16 POUNDS

ACCESSORIES FURNISHED

DESCRIPTION	PART NO.
AUXILIARY SCRIBER	14343
SCRIBER CARRIER	99205

Cat. No.	EDP No.	Description
259-24	56659	Dial Height Gage
259ZZ-24	56684	Case Only

Packed One Per Box

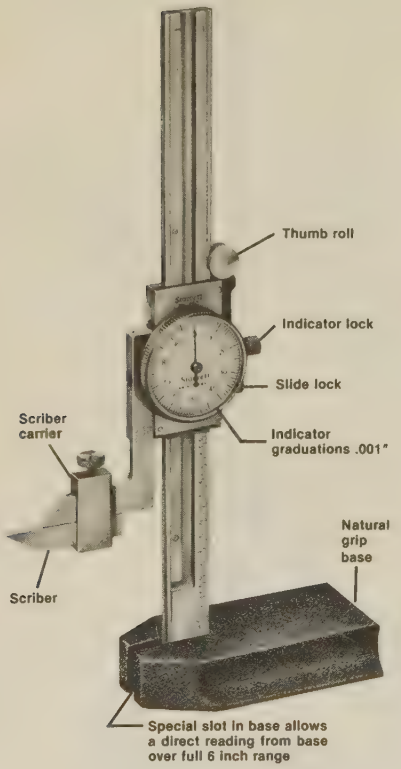
UP. Direct reading indicator in plus direction with zero reset button.

DOWN. Direct reading indicator in minus direction with zero reset button.

No. 250 Dial Height Gage

6 Inch Range

Stainless Steel



No. 250-6

- ★ Hardened stainless steel
- ★ Natural grip black wrinkled base
- ★ Positive split-gear anti-backlash
- ★ Graduations .001 inch
- ★ Comes complete with hardened ground scriber point and scriber carrier

250-6
6 Inch Dial Height Gage

Another new tool added to Starrett's "DIAL" line of precision measuring instruments, the No. 250-6 Dial Height Gage. Same quality as Starrett's famous dial calipers, easy to read with accuracy to .001 inch. A thumb roll provides rapid travel and extremely fine adjustment. Knurled thumb screws lock the movable slide and adjustable indicator dial at any setting. Special hardened and ground base is notched and allows readings from zero base position up to a full six inches. The auxiliary scriber may be replaced with a depth attachment or a Last Word® Dial Test Indicator.

250D
Depth Gage Attachment

The No. 250D Depth Gage Attachment replaces the standard scriber and measures the depth of holes, slots, recesses, inside of jigs, fixtures and over high projections. Adjustable rod is held in the desired position by a knurled binding nut.

Cat. No.	EDP No.	Size	Graduation	Description
250-6	56699	6″	.001″	6″ Dial Height Gage Without Case
250Z-6	56703	6″	.001″	6″ Dial Height Gage In Case
250D	51383	6″	—	Depth Gage Attachment

Packed One in a Box

SATIN CHROME Flush Reading Vernier Height Gages

No. 255 Series—*8 Inch, 12 Inch, 18 Inch*

No. 255M—*300 mm (Metric)*

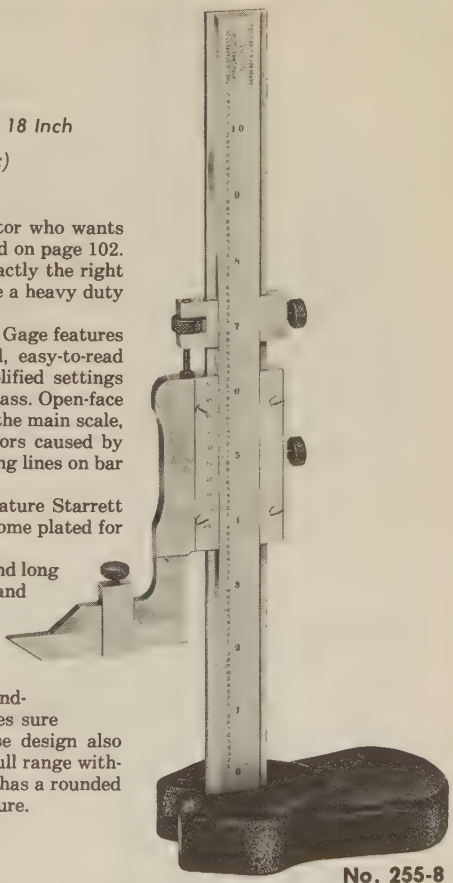
A perfect gage for every toolmaker and inspector who wants a lighter-weight gage than the No. 254 described on page 102. The No. 255 Vernier Height Gage combines exactly the right balance and weight for many applications where a heavy duty gage is not practical.

Like the No. 254, the Starrett No. 255 Height Gage features a long 50-division Vernier with widely spaced, easy-to-read graduations which make possible greatly simplified settings and readings without the use of a magnifying glass. Open-face design with flush fitting of the Vernier scale to the main scale, both in the same plane, eliminates reading errors caused by parallax, and insures exact alignment of matching lines on bar and Vernier.

All reading surfaces including the Vernier, feature Starrett SATIN CHROME finish. Surfaces are hard chrome plated for resistance to rust and stain.

The bar, hardened and stabilized for rigidity and long lasting accuracy, features combination straight and angular ways for positive alginment of graduations and easy adjustment of Vernier slide by hand and with fine adjusting nut.

Other features, too, make this Vernier Gage ideal for all layout and inspection work. A hand-fitting natural-grip hardened base design assures sure handling and easy movement. The special base design also permits direct readings from the base over the full range without calculations to introduce errors. The scriber has a rounded point and cuts clean, sharp lines with less pressure.



No. 255-8

Cat. No.	EDP No.	Size	Graduation	Bar		Base			Case
				Width	Thickness	Length	Width	Height	
255Z-8	56300	8″	.001″	15/16″	7/32″	4 7/16″	2 9/32″	7/8″	In Case
255-8	56301								Without Case
255Z-12	51229	12″	.001″	15/16″	7/32″	4 7/16″	2 9/32″	7/8″	In Case
255-12	51230								Without Case
255Z-18	51231	18″	.001″	15/16″	7/32″	4 7/16″	2 9/32″	7/8″	In Case
255-18	51232								Without Case
255MZ-300	56218	300 mm	0.02 mm	15/16″	7/32″	4 7/16″	2 9/32″	7/8″	In Case
255M-300	56219								Without Case

NOTE: No. 255XAS (EDP No. 56623) Tungsten Carbide Scriber (3/16″ x 25/64″ (10 mm) x 2.8″) available for 8″, 12″ and 18″ Height Gages

NOTE: No. 255TC (EDP No. 51233) Depth Gage Attachment available for 8″, 12″ and 18″ Height Gages

Furnished With Scriber and in Case Unless Otherwise Ordered—Packed One in a Box

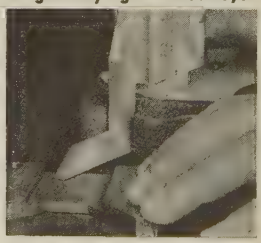
SATIN CHROME
Flush Reading
Master Vernier Height Gages

No. 254 Series— *12 Inch to 72 Inch*

No. 254M Series— *300 mm to 900 mm (Metric)*

No. 254E&M Series— *12 Inch and 300 mm to 24 Inch and 600 mm (English and Metric)*

- ★ **NEW LONG VERNIER, OPEN FACE DESIGN**
  50 widely spaced graduations for easy reading or setting without a magnifying glass.
- ★ **HALF-AS-MANY bar graduations as conventional vernier tools for easier alignment, maximum accuracy.**
- ★ **NEW FAST, SENSITIVE SLIDE ADJUSTMENT**
  Full length adjusting screw with fine adjustment knob on base eliminates reaching, gives smooth, full range, fine adjustment. Quick adjustment by split nut on screw. Additional remote fine adjusting knob on top of bar on 36" sizes and larger.
- ★ **NEW FLUSH-FITTING VERNIER**
  Flush-fitting master bar and vernier plate eliminate parallax. No optical reading errors.
- ★ **NEW HARDENED-STABILIZED MASTER BAR**
  Only Starrett provides hardened bars on Vernier tools to insure maximum rigidity, lasting accuracy.
- ★ **NEW VIBRATION-PROOF DESIGN**
  Special master bar construction plus substantial size and weight of base eliminate vibration—even with scriber fully extended.
- ★ **NEW NATURAL-GRIP HARDENED BASE**
  Hand-fitting base design with convenient finger grooves for sure-grip handling and easy movement. Hardened, ground and lapped square with the bar.
- ★ **ROUNDED SCRIBER POINT cuts clean, sharp lines with less pressure.**
- ★ **NEW FULL RANGE, DIRECT READING DESIGN**
  Special design permits direct readings from base over the full range. No calculations to introduce errors.
- ★ **NEW NO-GLARE SATIN CHROME FINISH**
  Easy, accurate reading in any light without eye-strain.



Specially designed hardened base permits direct readings from base over full range.

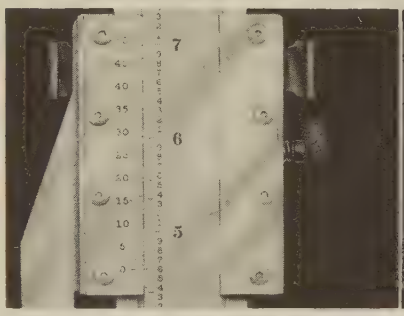
(Continued on next page)

Satin Chrome Flush Reading Master Vernier Height Gages

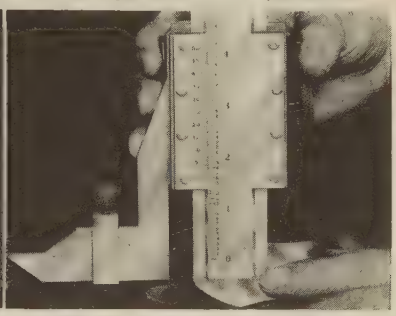
No. 254 Series—*12 Inch to 72 Inch*

No. 254M Series—*300 mm to 900 mm (Metric)*

No. 254E&M Series—*12 Inch and 300 mm to 24 Inch and 600 mm (English and Metric)*



Open-face long Vernier with 50 widely spaced graduations for easy reading. Flush-fitting Vernier and Master bar eliminates parallax.



Quick adjusting screw release permits rapid adjustment of slide to approximate setting followed by precise positioning with fine adjustment knob.

Fine adjustment knob on base in conjunction with full length adjusting screw provides highly sensitive slide adjustment. No reaching. Adjusting pressure against base and not on bar as with conventional gages.

Cat. No.	EDP No.	Size	Bar Width	Bar Thickness	Base Length (approx.)	Base Width (approx.)	Base Height
			Graduation — .001"				
254Z-12	51219	12"	1-3/8"	11/16"	5-13/16"	3-13/16"	1-1/4"
254Z-18	51220	18"	1-3/8"	11/16"	7-9/16"	4-9/16"	1-1/4"
254Z-24	51221	24"	1-3/8"	11/16"	7-9/16"	4-9/16"	1-1/4"
254Z-36	51222	36"	1-7/8"	1"	10"	6-1/2"	1-3/4"
254Z-48	51223	48"	1-7/8"	1"	10"	6-1/2"	1-3/4"
		60"*	1-7/8"	1"	10"	6-1/2"	1-3/4"
		72"*	1-7/8"	1"	10"	6-1/2"	1-3/4"
			Graduation — 0.02 mm				
254MZ-300	56214	300 mm	1-3/8"	11/16"	5-13/16"	3-13/16"	1-1/4"
254MZ-450	56215	450 mm	1-3/8"	11/16"	7-9/16"	4-9/16"	1-1/4"
254MZ-600	56216	600 mm	1-3/8"	11/16"	7-9/16"	4-9/16"	1-1/4"
254MZ-900	56217	900 mm	1-7/8"	1"	10"	6-1/2"	1-3/4"
			Graduation — .001" and 0.02 mm				
254EMZ-12	51224	12" and 300 mm	1-3/8"	11/16"	5-13/16"	3-13/16"	1-1/4"
254EMZ-18	51225	18" and 450 mm	1-3/8"	11/16"	7-9/16"	4-9/16"	1-1/4"
254EMZ-24	51226	24" and 600 mm	1-3/8"	11/16"	7-9/16"	4-9/16"	1-1/4"

NOTE: Hardened Bars on 12", 18", 24" sizes.
NOTE: No. 254XFS (EDP No. 51228) Tungsten Carbide Scriber (1/4" x 1/2" x 3-1/8") available for 12", 18" and 24" Height Gages.

*NOTE: 60 and 72 inch sizes available on special order; prices on application.

Furnished With Scriber and in Finished Wood Case
No. 254H (EDP No. 51227) Depth Gage Attachment available for 12", 18" and 24" Height Gages. See page 106 for additional attachments.
Packed One in a Box

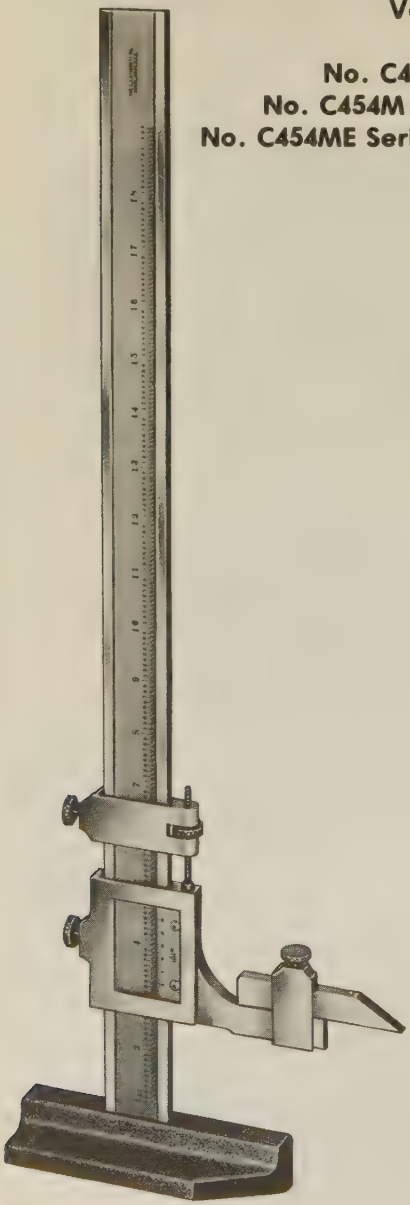
Vernier Height Gages

Satin Chrome Finish

No. C454 Series—*18 Inch and 24 Inch*

No. C454M Series—*450 mm and 600 mm (Metric)*

No. C454ME Series—*450 mm and 18 Inch (Metric and English)*
600 mm and 24 Inch (Metric and English)



No. CP454-18 with Satin Chrome finish

- ★ Satin Chrome Finish. Easy, accurate readings in any light without eye strain.
- ★ New Double-Length 25-Division Vernier Plate with Widely Spaced Graduations. Satin Chrome for Easier, Faster Readings Without Magnifying Glass.
- ★ Hardened and Ground Bar and Base—Base also Lapped—For Dependable, Lasting Precision.
- ★ Sharp, Clean-Cut Graduations—Machine Divided for Uniform Width and Depth—Gives Accurate Settings and Readings.
- ★ Tight, Smoothly Fitted Slides—Insure Maximum Accuracy, Easy Adjustment.
- ★ 36" and 48" sizes available on special order.

Vernier Height Gages

Satin Chrome Finish

No. C454 Series—*18 Inch and 24 Inch*

No. C454M Series—*450 mm and 600 mm (Metric)*

No. C454ME Series—*450 mm and 18 Inch (Metric and English)*
600 mm and 24 Inch (Metric and English)

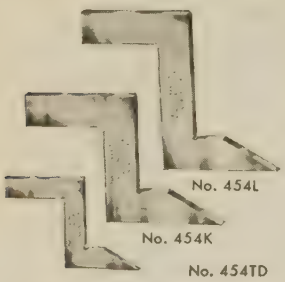
continued

With Attachment*				Without Attachment				Size	Range
In Case		Without Case		In Case		Without Case			
Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.		
SATIN CHROME FINISH **Graduation — .001"**									
C454Z-18	52378	C454-18	52379	CP454Z-18	52380	CP454-18	52381	18"	1½ to 18"
C454Z-24	52382	C454-24	52383	CP454Z-24	52384	CP454-24	52385	24"	2 to 24"
SATIN CHROME FINISH **Graduation — 0.02 mm**									
—	—	—	—	CP454MZ-450	56087	CP454M-450	56086	450 mm	40 to 450 mm
—	—	—	—	CP454MZ-600	56091	CP454M-600	56090	600 mm	50 to 600 mm
SATIN CHROME FINISH **Graduation — 0.02 mm on front side, .001" on reverse side**									
—	—	—	—	CP454MEZ-450	56220	CP454ME-450	56221	450 mm and 18"	40 to 450 mm 1½ to 18"
—	—	—	—	CP454MEZ-600	56471	CP454ME-600	56472	600 mm and 24"	50 to 600 mm 2 to 24"

*No. 454H (EDP No. 51227) Depth Gage Attachment with 8" Rod
NOTE: See Page 106 for steel, carbide and offset scribers
NOTE: 36" and 48" sizes available on special order

Available With Attractive Protective Case—Sent With Case and With Depth Gage Attachment Unless Otherwise Ordered
Packed One in a Box

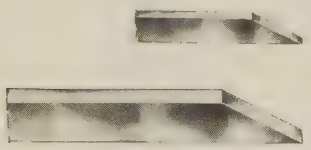
Offset Scribers for No. 454 Vernier Height Gages



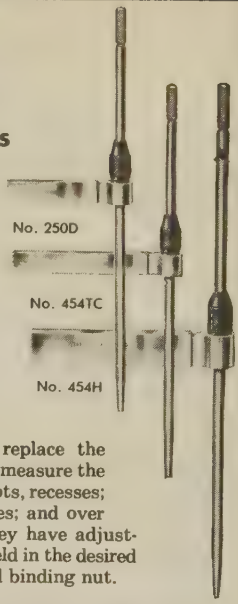
An offset scriber makes it possible to measure from the bottom of the height gage base, over and under shoulders, and in places inaccessible to the straight scriber. With the offset inverted, measurements can be taken and lines scribed beyond the normal range of the gage.

Cat. No.	EDP No.	Offset	Fits Vernier Height Gage No.
454TD	52358	1″	454-12″
454K	52365	1½″	454-18″
454L	52374	2″	454-24″
454MTD	52391	25 mm	454M-300 mm
454MK	52398	40 mm	454M-450 mm
454ML	52407	50 mm	454M-600 mm

Packed One in a Box



Depth Gage Attachments for Vernier Height Gages



These attachments replace the standard scriber and measure the depth of holes and slots, recesses; inside of jigs, fixtures; and over high projections. They have adjustable rods which are held in the desired position by a knurled binding nut.

Cat. No.	EDP No.	Rod Length	Fits Vernier Height Gage No.
255TC or 454TC	51233	6″	255-8″, 12″, 18″, 300 mm 454-12″
254H or 454H	51227	8″	254-12″, 18″, 24″ 454-18″, 24″, 450 mm, 600 mm
250D	51383	6″	250, 354-6″

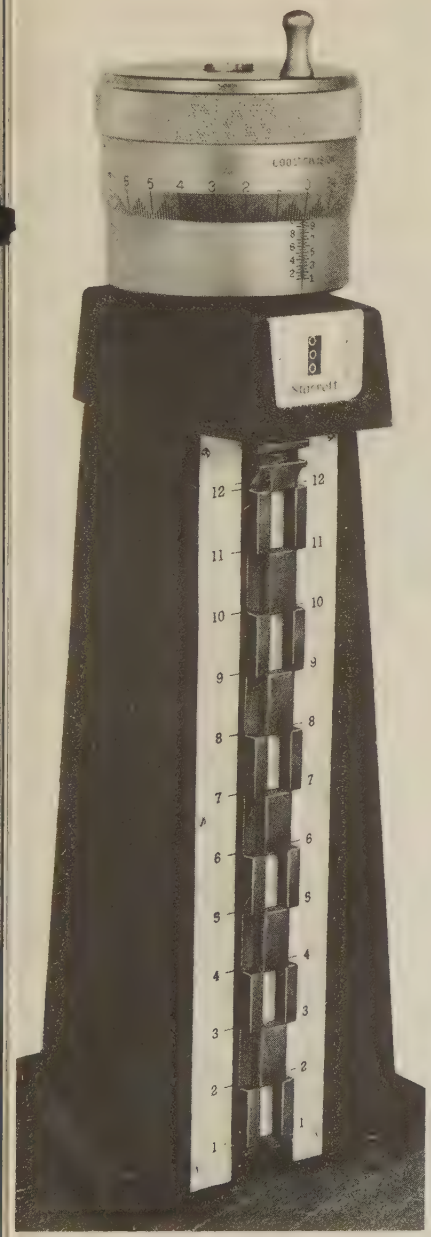
Packed One in a Box

Straight Scribers for Vernier Height Gages 2″ — 10″ Lengths

Made of hardened Steel or tungsten carbide tipped steel for scribing sharp, well-defined lines on any material.

Cat. No.	EDP No.	Point	Size	Fits Vernier Height Gage No.
454AS	71144	Steel	3/16″ x 11/32″ x 2″	454-12″
454XAS	51234	Carbide		
255AS	71460	Steel	3/16″ x 25/64″ (10 mm) x 2.8″	255-8″, 12″, 18″, 300 mm
255XAS	56623	Carbide		
454FS	70585	Steel	1/4″ x 1/2″ x 3″	254-12″, 18″, 24″ 254M-300, 450, 600 mm 254M&E-12″, 18″, 24″ 454-18″, 24″
454XFS	51228	Carbide		
454R	52367	Steel	1/4″ x 1/2″ x 6″	
454XR	56337	Carbide		
454Y	52368	Steel	1/4″ x 1/2″ x 10″	
454MFS	56339	Steel	1/4″ x 25/64″ (10 mm) x 3″	454M-450 mm, 600 mm 454M&E-450 mm, 600 mm
454MXFS	56336	Carbide		
454MXR	56338	Carbide	1/4″ x 25/64″ (10 mm) x 6″	
254BS	72288	Steel	3/8″ x 5/8″ x 3 3/8″	254-36″, 48″, 900 mm

Packed One in a Box



DIGI-CHEK Height Gages

12", 18" and 24" Ranges

300 mm, 450 mm and 600 mm Ranges (Metric)

No. 258 Series

For Fast Ultra-Accurate Height Gage Settings

No. 258 DIGI-CHEK Height Gage combines the accuracy of gage blocks with a precision micrometer head and digital readout. All readings are vertical and directly in line with the operator's vision for fast precise settings. An ideal instrument for transferring height settings in .0001" with accuracy of .000050".

The gage is housed within an extremely rigid, heavily flanged frame for stability. Base has a three-point bearing on three ground and lapped pads and is virtually tip-proof. Frame has attractive, wrinkle finish.

Height settings, **either over or under,** are obtained from a column of gage blocks mounted within the frame. The gage blocks are in 1" increments, permanently wrung together. Made of finest grade steel specially heat treated for minimum Rockwell hardness of $65 \pm \frac{1}{2}$ "C" scale. Mating gage surfaces are specially treated to prevent corrosion.

A unique "free standing" assembly system of gage blocks allows the blocks to conform to temperature variations independent of the frame, thereby reading the same as the work piece.

The gage block column is moved up and down over a 1" range by operation of the micrometer head. Scales on either side of the gage blocks read to the nearest inch, the digital readout gives the thousandths reading, and the final ten-thousandths of an inch is read from the micrometer head.

Both **over and under** heights can be checked directly from the gage blocks in a single setting since reference surfaces are provided on the top and bottom of each block and top and bottom of adjacent blocks are exactly in same plane. Need to add or subtract block thickness is thus eliminated. Readings also can be taken from either left, center, or right of the gage block column.

The lower block in the gage block column is only .090" thick which permits checking parts .100" in height. The gage block column design permits wringing a one-inch block between two blocks in the column. This provides a convenient means of setting

★ **Micrometer head has speeder-type hand knob for rapid rotation to desired setting.**

★ **Super-precision micrometer head direct reading in .0001", range 1". Satin-Chrome finish. One-piece spindle, hardened, threads ground from solid and stabilized.**

★ **Extra-large 4 1/16" diameter thimble with widely spaced graduations specially staggered for quick reading.**

★ **DIGI-CHEK digital readout, reads in .001", range 1". DIRECT VISION design with micrometer head and DIGI-CHEK mounted on top of gage directly in line with operator's vision. All figures vertical for fast reading. DIGI-CHEK entirely enclosed at top of gage for maximum protection—does not extend out from frame of gage.**

★ **Gage block column in 1" increments permanently wrung together with surfaces specially treated to prevent corrosion. Made of finest steel heat treated to minimum Rockwell 65±½ "C" scale.**

★ **Gage block column moved up and down by micrometer head. Scales on either side read to nearest inch, DIGI-CHEK in .001", and micrometer in final .0001". Gage block column free standing to conform to temperature variations.**

★ **Over and Under heights checked directly in single setting. Reference surfaces at top and bottom of each block and top and bottom of adjacent blocks in same plane. Readings also can be taken from either left, center, or right of the gage block column.**

★ **Extremely rigid, heavily flanged frame for stability.**

★ **Base with 3-point bearing on three ground and lapped pads. Virtually tip-proof.**

★ **10" Riser Block also available for increased height capacity.**

and checking other gages such as inside micrometers, end measuring rods, dial bore gages, etc.

An outstanding DIGI-CHEK feature is DIRECT VISION. Digital readout and also the micrometer head are mounted on top of the frame directly in line with the operator's vision. All figures including the reference inch scales are located **vertically** for fast, easy reading. Digital readout is entirely enclosed at top of gage for maximum protection and does not extend from frame of gage.

The super-precision micrometer head which controls movement of the gage block column has an extra-large 4 1/16" diameter thimble and a speeder-type hand knob for rapid rotation of the head to the desired setting. The head has direct-reading, widely spaced graduations in .0001" specially staggered for quick reading. Range is one inch.

Thimble and sleeve have Satin-Chrome No-Glare finish for easier, faster readings. The spindle is one-piece, hardened, with threads ground from the solid and stabilized.

Cat. No.	EDP No.	Range	Graduation: Scales	Graduation: Digital Readout	Graduation: Micrometer Head	Accuracy
258-12	51244	.100" to 12.100"	Inches	.001"	.0001"	.000050"
258-18	56013	.100" to 18.100"	Inches	.001"	.0001"	.000050"
258-24	56284	.100" to 24.100"	Inches	.001"	.0001"	.000004" per Inch
258M-300	51246	2 mm to 302 mm	Millimeters	0.01 mm	0.002 mm	0.0010 mm
258M-450	56034	2 mm to 452 mm	Millimeters	0.01 mm	0.002 mm	0.0010 mm
258M-600	56285	2 mm to 602 mm	Millimeters	0.01 mm	0.002 mm	0.0001 mm per 25 mm

NOTE: see next page for Riser Blocks and Reverse Reading Blocks
NOTE: finished wood case also available, extra

Furnished in Shipping Container; Plastic Dust Cover Included With Each Instrument.

Digi-Chek Height Gage, No. 258 Series Accessories

Reverse Reading Blocks
No. 258RRB Series

English or Metric

Used on No. 258 Digi-Chek Height Gages for the precise calibrating of working gages and for setting dial bore gages as shown. The block fits in alternate inch positions, its tongue entering the odd numbers and its groove entering the even numbers of the gage block stack.

Cat. No.	EDP No.	Description
258RRB	56014	Fits No. 258-12", 18" and 24" Digi-Cheks
258RRBM	56015	Fits No. 258M-300 mm, 450 mm and 600 mm Digi-Cheks

Packed One in a Box

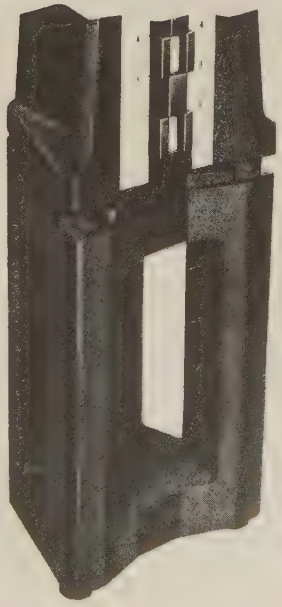
Riser Blocks
No. 258R Series

English or Metric

Increases the range of English reading Digi-Chek Height Gages by 10 inches and metric reading Digi-Cheks by 250 millimeters. Heavily flanged for rigidity and stability. Both top and base have three ground and lapped pads to match the pads on the Digi-Chek base. A retaining plate prevents the Digi-Chek from being pushed or sliding off the pads. Attractive black wrinkle finish all over. If desired, riser blocks can be stacked one on top of another.

Cat. No.	EDP No.	Height	Accuracy	Description
258R	51248	10 in.	+.000040" –.000000	For 12" gage
258RA	56202	10 in.	+.000040" –.000000	For 18" gage
258MR	51249	250 mm	+0.001 mm –0.000	For 300 mm gage
258MRA	56203	250 mm	+0.001 mm –0.000	For 450 mm gage

Packed One in a Box

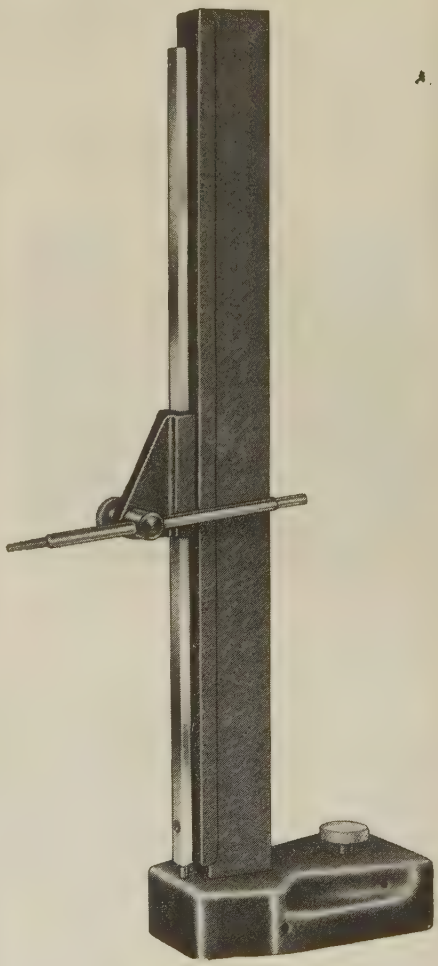


Height Transfer Gage

14 Inch, 24 Inch, 48 Inch Sizes
Larger Sizes Available on Special Order

No. 252 Series

With Smooth, Positive Fine Adjustment



THE Starrett No. 252 Height Transfer Gage is an ideal instrument for use with test indicators or electronic amplifiers to accurately transfer height settings from gage blocks, optical height gages or other standards. Extreme rigidity provides the vibration-proof stability necessary to permit precise repeat readings with indicators of the highest amplification.

The gage is made in three sizes—14, 24 and 48 inch. All have an extremely rigid, rectangular box-type hollow column mounted integrally on a heavy base. The base has hand-fitting design for sure-grip handling and easy movement. Bottom of the base has three ground and lapped pads for three-point stability and smooth movement on the surface plate. Base and column have attractive black wrinkle finish.

An adjustable slide, incorporating a snug for holding test indicators or electronic gage heads, has rapid, vertical manual adjustment on a steel dovetail on the front of the column and can be locked at the approximate height desired by a thumb screw.

The entire dovetail and slide unit has fine vertical adjustment of approximately ⅜″ relative to the fixed column by means of a knob on the base. This permits the slide with its test indicator to be quickly adjusted to the approximate position desired; then very accurately to the precise setting using the fine adjustment. The fine adjustment is smooth and positive, especially for small variations or minute increments. BECAUSE THE ADJUSTING MECHANISM IS LOCATED IN THE BASE, THE VERTICAL COLUMN AND INDICATOR ARE ISOLATED AND NOT AFFECTED BY ANY EXTERNAL INFLUENCE SUCH AS HEAT OR HAND PRESSURE.

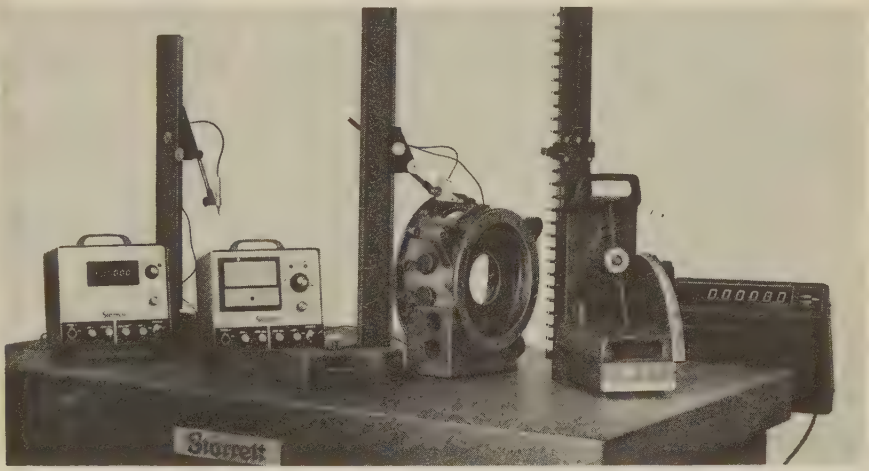
A snug on the slide provides two holes .375″ and .156″ diameter for holding gage rods or scribers. A 9″ rod furnished with the gage is especially useful for reaching confined areas or reaching heights greater than the range of the height gage. The rod has a major diameter of .375″ and two stepped diameters of ¼″ and 7/32″ at one end and 5/16″ at the opposite end. No. 711 Last Word and all other Test Indicators can be mounted on this rod or No. 196 Test Indicators using a No. 196K or L snug (extra). Also furnished with the gage is the No. 657J Gage Holding Rod to accommodate the No. 812-1 Gaging Head when the No. 252 is

(Continued on next page)

Height Transfer Gage

14 Inch, 24 Inch, 48 Inch Sizes

No. 252 Series



Checking height of machined face on a casting using No. 252-48" Height Transfer Gage with No. 812-1 Lever Type Gaging Head and No. 812-12 Electronic Gage Amplifier. Height dimension is set to Digi-Chek II Height Master, right. The Digital Electronic Gage Amplifier, far left, is No. 812-14 connected to No. 812-2 Cartridge Type Gaging Head mounted on No. 252-24" Height Transfer Gage.

used with the No. 812 Electronic Gage. A convenient wire retaining clip mounted on the movable slide keeps electronic gage head cables from deflecting the gage holding rod.

No. 25, No. 81, No. 655 and No. 656 Dial Indicators also can be used on the height gage by means of a No. 657J gage rod (furnished). Other useful attachments (extra) are No. 57C or No. 57D 12" and 18" surface gage spindles—extremely useful for scribing and layout.

Cat. No.	EDP No.	Range	Fine Adjustment approx.	Base Size approx.	Gage Rod
252Z-14	55890	14"	3/8"	5¾"x3½"x1½"	9"x.375" O.D. with steps ¼", 7/32", 5/16" O.D.
252Z-24	51216	24"	3/8"	7½"x4½"x2"	9"x.375" O.D. with steps ¼", 7/32", 5/16" O.D.
252Z-48	51217	48"	3/8"	9"x6"x2½"	9"x.375" O.D. with steps ¼", 7/32", 5/16" O.D.

NOTE: Larger Sizes Available on Special Order.
No. 711, No. 196 Test Indicators, No. 25, No. 81, No. 655, No. 656 Dial Indicators and Supplementary Attachments Also Available.

Furnished with 9" Rod and No. 657J Gage Holding Rod in Finished Wood Case
Packed One in a Box

Gear Tooth Vernier Calipers

20 to 1 Diametral Pitch

1 ¼ to 25mm Module (Metric)

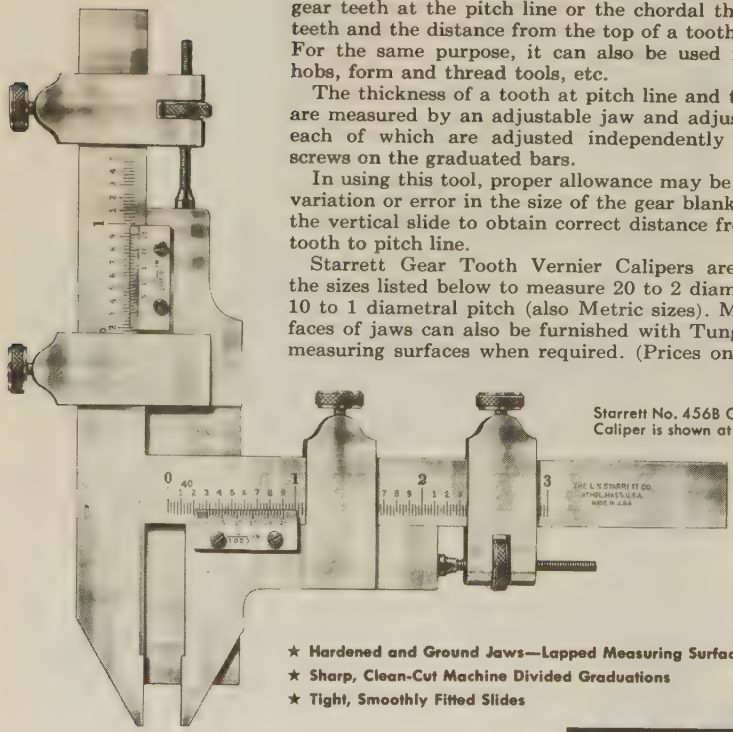
No. 456 Series

THE STARRETT No. 456 Gear Tooth Vernier Caliper is designed to measure in thousandths of an inch the thickness of gear teeth at the pitch line or the chordal thickness of the teeth and the distance from the top of a tooth to the chord. For the same purpose, it can also be used for measuring hobs, form and thread tools, etc.

The thickness of a tooth at pitch line and the addendum are measured by an adjustable jaw and adjustable tongue, each of which are adjusted independently by adjusting screws on the graduated bars.

In using this tool, proper allowance may be made for any variation or error in the size of the gear blank when setting the vertical slide to obtain correct distance from top of the tooth to pitch line.

Starrett Gear Tooth Vernier Calipers are available in the sizes listed below to measure 20 to 2 diametral pitch or 10 to 1 diametral pitch (also Metric sizes). Measuring surfaces of jaws can also be furnished with Tungsten Carbide measuring surfaces when required. (Prices on application.)



Starrett No. 456B Gear Tooth Vernier Caliper is shown at left.

★ **Hardened and Ground Jaws—Lapped Measuring Surfaces**

★ **Sharp, Clean-Cut Machine Divided Graduations**

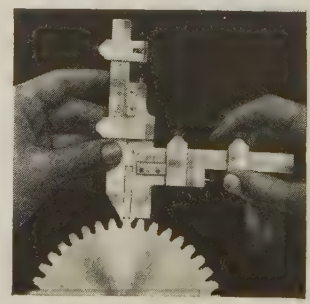
★ **Tight, Smoothly Fitted Slides**

In Case		Without Case		Size
Cat. No.	EDP No.	Cat. No.	EDP No.	
Graduation — .001"				
456AZ	52420	**456A**	52422	20 to 2 diametral pitch
456BZ	52424	**456B**	52426	10 to 1 diametral pitch
Graduation — 0.02 mm				
456MAZ	52421	**456MA**	52423	1¼ to 12 mm module
456MBZ	52425	**456MB**	52427	2½ to 25 mm module

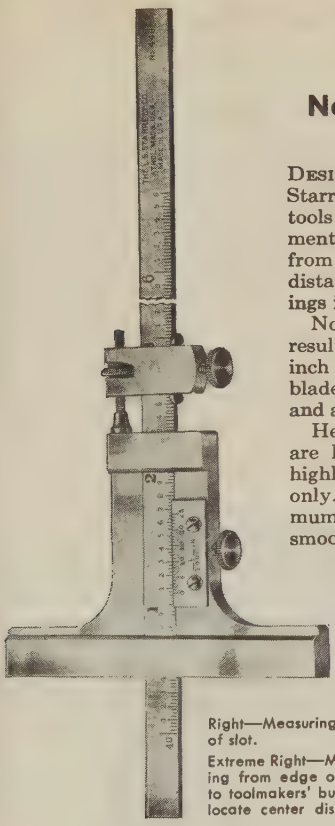
Available with Tungsten Carbide Measuring Surfaces.
Prices on Application

Available With Attractive, Protective Case—
Sent With Case Unless Otherwise Ordered

Packed One in a Box



Measuring a gear tooth with the Starrett Gear Tooth Vernier Caliper. Reading is in thousandths of an inch.



Right—Measuring depth of slot.

Extreme Right—Measuring from edge of work to toolmakers' button to locate center distances.

Vernier Depth Gages

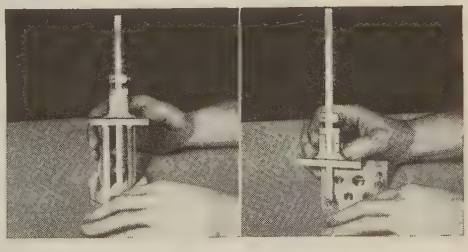
No. 448 Series—*6 Inch and 12 Inch*

No. 448ME Series—*150mm and 6 Inch, 300mm and 12 Inch (Metric and English)*

DESIGNED for measuring depth of holes, slots and recesses, Starrett No. 448 Vernier Depth Gages are highly accurate tools which find wide use in toolrooms and inspection departments on jig, fixture and die work. Also ideal for measuring from a plane surface to toolmakers' buttons in locating center distances. Has precision adjustment by a Vernier with readings in thousandths of an inch.

No. 448 Vernier Depth Gages now have extra capacity as a result of their new longer blade lengths, permitting full 6 inch and 12 inch readings. Three sizes available with 6 inch blades, 12 inch blades, or both 6 inch and 12 inch blades, and also Metric and English sizes as listed below.

Heads are hardened, ground and lapped and the blades are hardened and ground. Blades have sharp, clean-cut, highly accurate machine divided graduations on one side only. Gages in English measure are Quick Reading. Maximum accuracy and easy adjustment are insured by tight, smoothly fitted Vernier slides. Vernier plates are adjustable.



In Case		Without Case		Blades		Range	Base	
Cat. No.	EDP No.	Cat. No.	EDP No.	Quan.	Size		Length	Width
Graduation — .001"								
448Z-6	52306	**448-6**	52305	1	6"	0 to 6"	2¾"	¼"
448Z-12	52308	**448-12**	52307	1	12"	0 to 12"		
448Z-612	52310	**448-612**	52309	2	6" & 12"	0 to 12"		
Graduation — 0.02 mm and .001" — Both Edges								
448Z-6ME	52312	**448-6ME**	52311	1	150 mm & 6"	0 to 150 mm & 0 to 6"	70 mm	6.35 mm
448Z-12ME	52314	**448-12ME**	52313	1	300 mm & 12"	0 to 300 mm & 0 to 12"		
448Z-612ME	52316	**448-612ME**	52315	2	150 mm & 6" 300 mm & 12"	0 to 300 mm & 0 to 12"		

Available With Attractive, Protective Case—Sent With Case Unless Otherwise Ordered

Packed One in a Box

Rule Depth Gages

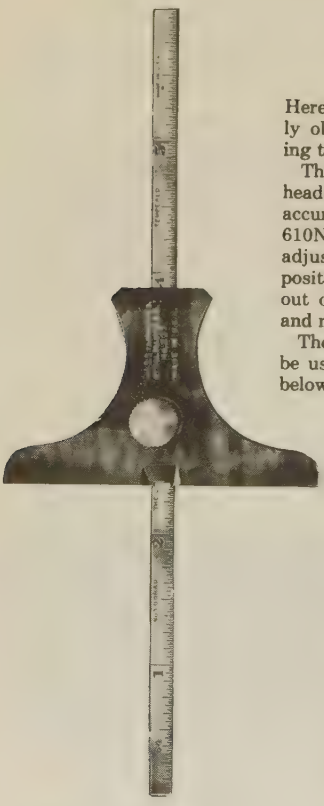
6 Inch or 150 mm (Metric)

No. 237 Series

Here's a very handy depth gage which can be used to quickly obtain measurements in 64ths of an inch by simply adjusting the rule to the required depth.

The gage consists of a nicely finished, case hardened steel head with a base surface 2⅝ inches long by 1/8 inch thick. An accurate, machine divided, tempered steel 6-inch rule (our No. 610N) is fitted to a slot in the head in which it can be smoothly adjusted to the required measurement and then locked in final position by a knurled nut and friction spring. The base is cut out on one side adjacent to the rule permitting easier readings and more accurate measurements.

The rule is 3/16 wide, graduated in 32nds and 64ths, and may be used separately if desired. Also available in Metric as listed below.



Starrett No. 237 Rule Depth Gage is shown above. Note cutout in base which permits more accurate measurements.

Checking the depth of a blind hole with the No. 237 Depth Gage.

Cat. No.	EDP No.	Rule Length	Rule Graduations	Head Length	Head Width
237	51080	6″	32nds, 64ths	2⅝″	1/8″
237M	51081	150 mm	mm, ½ mm	66.7 mm	3.2 mm

NOTE: Also available with C610N-6 Satin Chrome Rule.
NOTE: Rule also available with 64ths-100ths graduations.

Packed One in a Box

Also see No. 289C Height Gage and Depth Gage Set for Combination Squares on page 164.

Combination Depth and Angle Gage

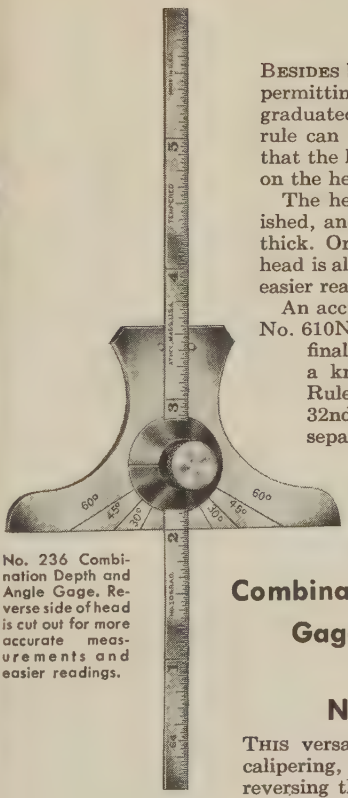
6 Inch

No. 236

BESIDES being a depth gage, the No. 236 also has a plus feature permitting use as a protractor for measuring angles. The head is graduated both right and left to 30, 45 and 60 degrees and the rule can be set to any of these angles by swinging the rule so that the line on the turret coincides with the degree graduation on the head.

The head is made of high grade steel, hardened, nicely polished, and has a large base surface 2 5/8 inches long by 1/8 inch thick. On one side, the base is cut out and the center of the head is also recessed to permit more accurate measurements and easier readings.

An accurate machine divided, tempered steel 6-inch rule (our No. 610N) is smoothly fitted to the head and can be locked in final position for depth or angles by a knurled nut and friction spring. Rule is 3/16 inch wide, graduated in 32nds and 64ths and may be used separately if desired.



No. 236 Combination Depth and Angle Gage. Reverse side of head is cut out for more accurate measurements and easier readings.

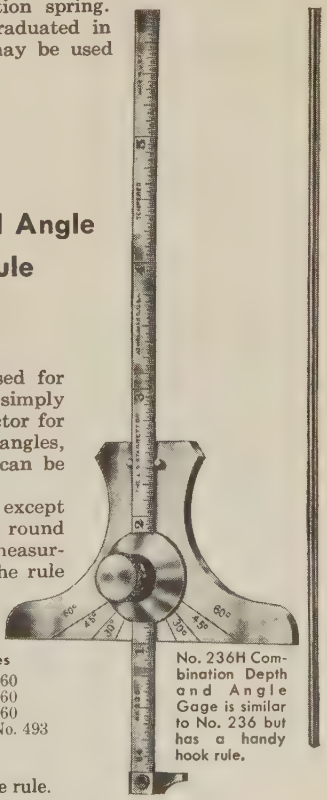
Combination Depth and Angle Gage with Hook Rule

6 Inch

No. 236H Series

THIS versatile gage can be used for calipering, as a depth gage by simply reversing the rule, as a protractor for measuring 30, 45 and 60 degree angles, and if the rule is removed it can be used separately as a hook rule.

Features are exactly like the No. 236 described above except that a special hook rule and an extra 6 inch long, 5/64 inch round rod are furnished with the gage. The rod can be used for measuring the depth of small holes, slots and recesses where the rule will not enter. Head length 2 5/8", width 1/8".



No. 236H Combination Depth and Angle Gage is similar to No. 236 but has a handy hook rule.

Cat. No.	EDP No.	Length	Rule Graduations	Rod Length	Degrees
236	51074	6"	32nds, 64ths	none	30, 45, 60
236HA	51075	6"	32nds, 64ths	none	30, 45, 60
236HB	51076	6"	32nds, 64ths	6"	30, 45, 60
236HC	51077	6" Hook Rule only for No. 236, No. 236H, No. 237, No. 493 and No. 493B			
236HD	51078	6" Rod only.			

NOTE: No. 236 also available with No. C610N-6 Satin Chrome rule.

Packed One in a Box

Dial Depth Gages
No. 450 Series 6 and 12 Inch
Base Extensions 7 and 12 Inch

No. 450-6 with
No. 450E-7 Base Extension

No. 450-6

☆ Removable hook with screw permanently attached to prevent loss.

☆ A STARRETT EXCLUSIVE

No. 450-12

No. 450E-7 7 inch Base Extension

No. 450E-12 12 inch Base Extension

- ★ **Hardened stainless steel**
- ★ **Positive split gear anti-backlash**
- ★ **Base .230 thick by 2¾ inches long**
- ★ **Width of bar .308 inches**
- ★ **Graduations .001 inch**
- ★ **Thickness of base extension .230**
- ★ **Base extensions come complete with screws**

Starrett's No. 450 Series Dial Depth Gages incorporate many of the features that have made dial calipers one of the more popular tools in inspection departments and toolrooms. Dial depth gages are easy to read, all readings are taken directly from the bar and the dial indicator. Designed for measuring accurately (thousandths of an inch) depths of holes, slots and recesses. Easily removable hook permits measuring internal and external slots. Optional base extensions can be used to increase the base span to 7 or 12 inches on both models.

Cat. No.	EDP No.	Size	Graduation	Description
450-6	56766	6"	.001"	6" Dial Depth Gage Without Case
450-12	56768	12"	.001"	12" Dial Depth Gage Without Case
450E-7	56769	7"	—	7" Base Extension
450E-12	56770	12"	—	12" Base Extension
450ZZ-6	56776	6"	—	6" Case Only
450ZZ-12	56777	12"	—	12" Case Only

Packed One in a Box.

Small Hole Gages

.125 to .500 Inch

3.2 to 12.7 mm (Metric)

No. 830 and No. 831 Series

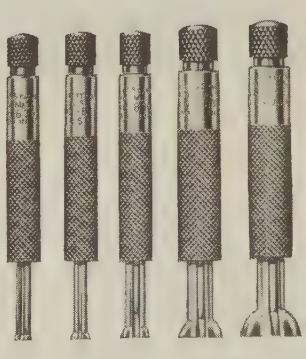
Hardened Ball Contact with Flat Bottom—
Ideal for Gaging Deep and Shallow Holes,
Slots, Recesses

No. 831 Gages are similar to No. 830 type but have longer length.

HOLES, slots, grooves and recesses ranging from .125" to .500", which are too small or shallow to use STARRETT Telescoping Gages, can be accurately measured with these STARRETT Small Hole Gages. Two types are available as listed on the next page—No. 830 short type gages for use in close quarters and No. 831 gages which have a longer length. The gaging surface on both types is a half ball with a flat bottom, permitting use in even the most shallow holes, slots and recesses.

These gages are adjusted to size by a convenient knurled knob at the end of the gage which provides smooth and sensitive adjustment and feel, thus insuring more accurate measurements. Final size in thousandths of an inch is obtained by using a micrometer over the contacts.

Check these added features which contribute to better shallow gaging. Contacts hardened for long life. Contact radius is less than any minimum diameter to be measured, insuring accurate gaging by means of two-point contact. A safety stop prevents possible breakage by limiting travel within the range of the gage. Length of each gage is designed for the best possible balance.



Starrett No. 830 Gages are only 2 inches long and very convenient to use in close quarters.

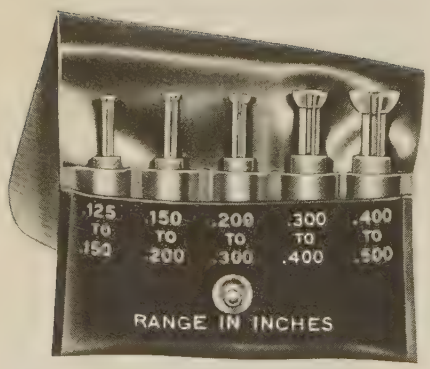
(Continued on next page)

Small Hole Gages

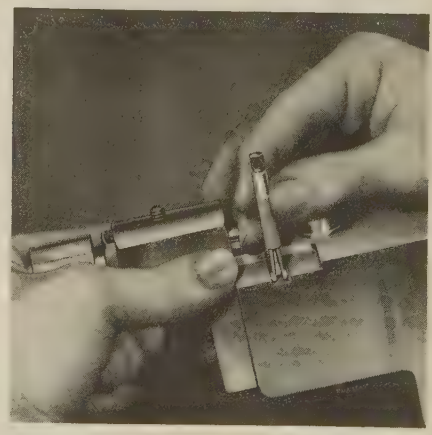
.125 to .500 Inch

3.2 to 12.7 mm (Metric)

No. 830 and No. 831 Series



No. 830 and No. 831 Gages available separately or as complete sets in attractive protective cases. No. S830F set shown above.



Both No. 830 and No. 831 Gages have ball contacts with flat ends permitting shallow slots and recesses to be measured.

Cat. No.	EDP No.	Range, English	Range, Metric	Length Approx.
830A	53076	.125 to .150″	3.2 to 3.8 mm	2″
830B	53077	.150 to .200″	3.8 to 5.1 mm	2″
830C	53078	.200 to .300″	5.1 to 7.6 mm	2″
830D	53079	.300 to .400″	7.6 to 10.2 mm	2″
830E	53080	.400 to .500″	10.2 to 12.7 mm	2″
S830FZ	53081	Set of Five (5) in Case		
831A	53083	.125 to .200″	3.2 to 5.1 mm	2 13/16″
831B	53084	.200 to .300″	5.1 to 7.6 mm	3 1/8″
831C	53085	.300 to .400″	7.6 to 10.2 mm	3 3/8″
831D	53086	.400 to .500″	10.2 to 12.7 mm	3 1/2″
S831EZ	53087	Set of Four (4) in Case		

Packed One in a Box—Individually or Sets

Individual Sizes—Six Boxes in a Carton

Small Hole Gages

.125 to .500 Inch

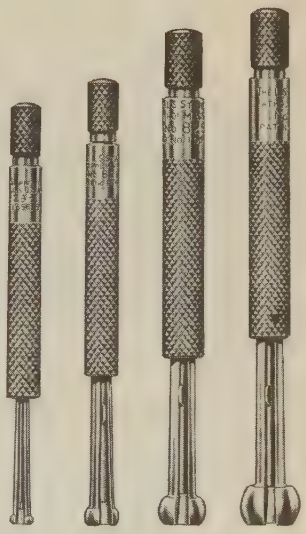
3.2 to 12.7 mm (Metric)

No. 829 Series

Hardened Ball Measuring Surface

with 2-point Contact—

Smooth, Sensitive Size Adjustment



STARRETT No. 829 Small Hole Gages are well balanced, sensitive tools ideal for accurately measuring small holes, slots, grooves and recesses in all kinds of work. Four different sizes available to cover the range from .125 to .500 inches. (For larger diameters, Starrett Telescoping Gages described in the following pages are recommended.)

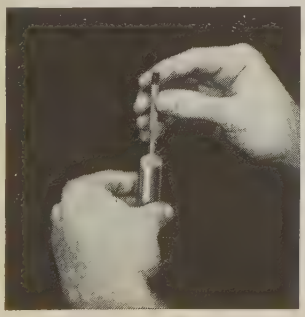
The contact surface on these gages consists of a split ball which is adjusted to size by a knurled knob at the end of the gage, thus providing smooth, sensitive adjustment and feel for more accurate measuring. Final size in thousandths of an inch is obtained by measuring over the ball contacts with a micrometer.

Contacts are hardened for long life and radius is less than the minimum diameter to be measured, thus providing two-point contact for maximum accuracy. Adjustment of the gage beyond its range is restricted by a safety stop, preventing breakage.

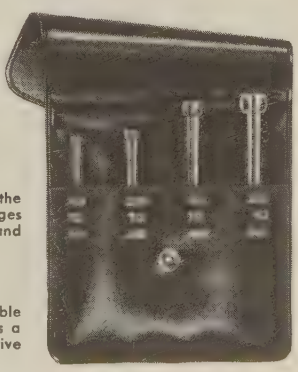
Cat. No.	EDP No.	Range, English	Range, Metric	Length Approx.
829A	53070	.125 to .200″	3.2 to 5.1 mm	2⅛″
829B	53071	.200 to .300″	5.1 to 7.6 mm	3″
829C	53072	.300 to .400″	7.6 to 10.2 mm	3⅜″
829D	53073	.400 to .500″	10.2 to 12.7 mm	3½″
S829EZ	53074	Set of Four (4) in Case		

Packed One in a Box—Individually or Sets

Individual Sizes—Six Boxes in a Carton



Left—Measuring a small hole with the Starrett No. 829 Gage. These gages also ideal on small slots, grooves and recesses.



Right—No. 829 Gages are available in 4 sizes, either separately or as a complete set in an attractive protective case as shown at right.

Telescoping Gages

5/16 to 6 Inches

7.9 to 152.4 mm (Metric)

No. 579 Series

Automatic Self Centering Handle—Insures Perfect Balance and Feel

THIS gage originates from our original No. 229 telescoping gage thus providing a choice of handle in the center or at the side. Both gages are equally popular for determining the true size of holes, slots and recesses.

The handle on No. 579 gages is rigidly attached to the contact plunger body, thus eliminating undesirable handle adjustment and looseness, and is automatically self centering at all times.

Both contact plungers telescope within each other, providing a rigid, positive seat for the contact plungers in all positions.

Constant spring tension gives uniform contact pressure and both plungers are easily locked at any desired setting by a slight turn of the knurled screw in the end of the handle. The ends of both contacts are hardened and ground to a radius to give proper clearance for the smallest hole the gage will enter. Final hole size is obtained by measuring over the gage contacts with a micrometer.

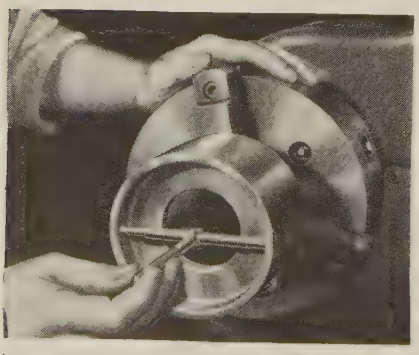
Available in six sizes, either in complete sets or singly, to measure from 5/16" to 6".

Cat. No.	EDP No.	Range, English	Range, Metric
579A	52610	5/16" to 1/2"	7.9 to 12.7 mm
579B	52611	1/2 to 3/4"	12.7 to 19 mm
579C	52612	3/4 to 1 1/4"	19 to 31.7 mm
579D	52613	1 1/4 to 2 1/8"	31.7 to 54 mm

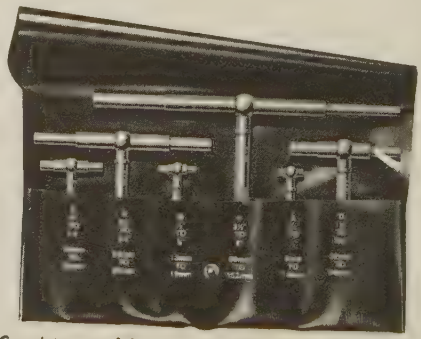
Cat. No.	EDP No.	Range, English	Range, Metric
579E	52614	2 1/8 to 3 1/2"	54 to 89 mm
579F	52615	3 1/2 to 6"	89 to 152.4 mm
S579GZ	52616	Set of Four (4) No. 579 A, B, C, D in Case	
S579HZ	52617	Set of Six (6) No. 579 A, B, C, D, E, F in Case	

NOTE: Longer handles can be furnished on request.

Packed One in a Box—Individually or Sets



Accurate size measurements are insured with the No. 579 Telescoping Gage. Handle is automatically self-centering.



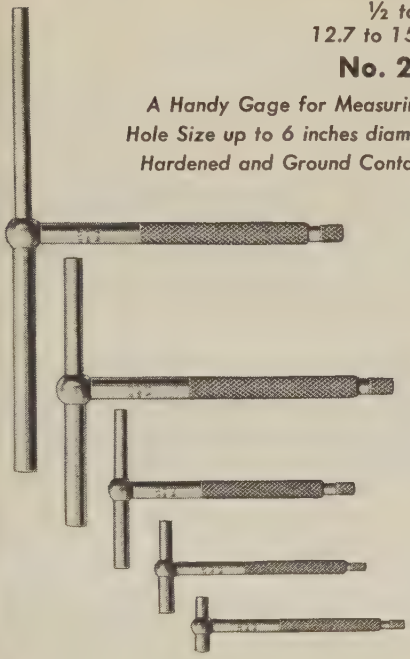
Complete sets of 4 or 6 No. 579 Telescoping Gages are available or these gages can be furnished singly.

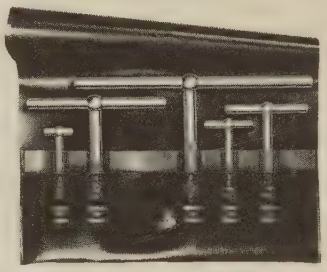
Telescoping Gages

½ to 6 Inches
12.7 to 152.4 mm (Metric)

No. 229 Series

A Handy Gage for Measuring Hole Size up to 6 inches diameter. Hardened and Ground Contacts



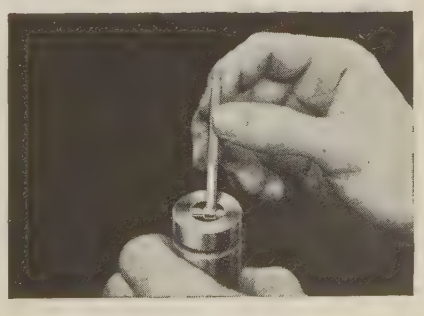


Starrett No. 229 Telescoping Gages available in sets of 3 or 5 in attractive protective cases, above, or singly, left.

INTERNAL measurements of holes and slots varying in sizes from ½ inch to 6 inches can be easily and accurately obtained with Starrett No. 229 Telescoping Gages. The gage consists of a convenient handle attached to a fixed contact within which a contact plunger telescopes under spring tension. To use the gage, it is inserted in the hole permitting the contact plunger to expand to hole size. After the proper "feel" is obtained, the contacts are securely locked by a slight turn of the knurled screw in the end of the handle. The exact size of the hole is then determined by removing the gage from the hole and measuring the distance across the two contacts with a micrometer. The ends of both contacts are hardened and ground to a radius to give proper clearance for the smallest hole the gage will enter. No. 229 Telescoping Gages are available in sizes from ½ inch to 6 inches, either singly or in complete sets.

Cat. No.	EDP No.	Range, English	Range, Metric
229A	50923	½ to ¾"	12.7 to 19 mm
229B	50924	¾ to 1¼"	19 to 31.7 mm
229C	50925	1¼ to 2⅛"	31.7 to 54 mm
229D	50926	2⅛ to 3½"	54 to 89 mm
229E	50927	3½ to 6"	89 to 152.4 mm
S229FZ	50928	Set of Three (3) No. 229 A, B, C in Case	
S229GZ	50929	Set of Five (5) No. 229 A, B, C, D, E in Case	

Packed One in a Box—Individually or Sets



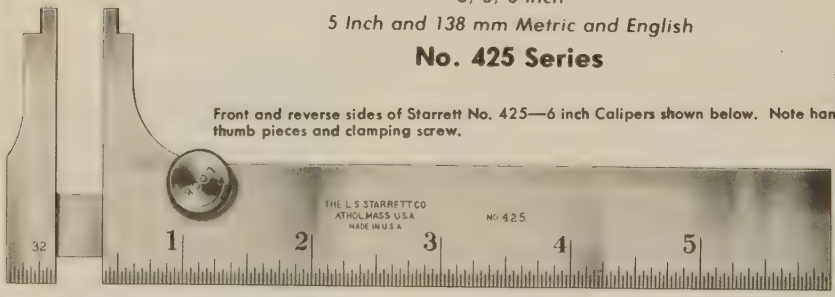
Checking a small hole with the No. 229 Telescoping Gage. Final size in thousandths is obtained by measuring over the contacts with a micrometer.

Pocket Slide Calipers

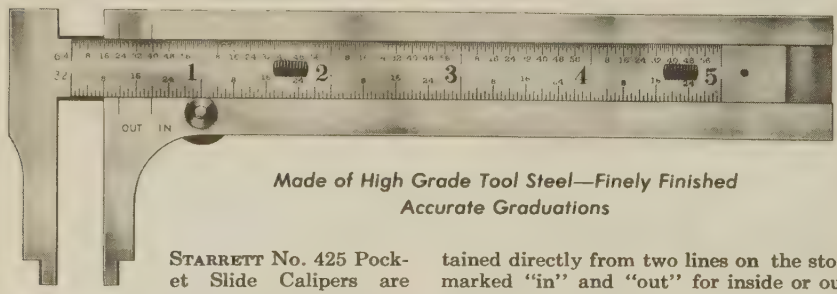
3, 5, 6 Inch

5 Inch and 138 mm Metric and English

No. 425 Series



Front and reverse sides of Starrett No. 425—6 inch Calipers shown below. Note handy thumb pieces and clamping screw.



Made of High Grade Tool Steel—Finely Finished
Accurate Graduations

STARRETT No. 425 Pocket Slide Calipers are very handy tools that permit quick, accurate outside and inside measurements. Made in 3 inch, 5 inch and 6 inch sizes; also in Metric & English as listed below. The slide of the 3 inch caliper is graduated in 64ths of an inch and that of 5 and 6 inch sizes in 32nds and 64ths on both edges as illustrated above. The stock of all sizes has a handy scale graduated in 32nds of an inch the full length. Accurate readings are assured since measurements are obtained directly from two lines on the stock marked "in" and "out" for inside or outside measurements.

These calipers have two knurled thumb pieces on the slide which makes it easy to open or close the jaws, and a knurled clamping screw with a left hand thread for locking the slide at any desired setting. The thumb on the same hand which holds the tool can be used for both these adjustments—a very handy feature. The slide also has a stop, preventing it from being entirely withdrawn.

Cat. No.	EDP No.	Size	Range		Depth of Jaws	Width of Nibs Closed	Graduations	
			Outside	Inside			Slide	Stock
425-3	51528	3″	0-2⅛″	⅛-2¼″	11/16″	⅛″	64ths	32nds
425-5	51529	5″	0-3¼″	¼-4″	1⅜″	¼″	32nds & 64ths	32nds
425-6	51530	6″	0-4¾″	¼-5″	1⅜″	¼″	32nds & 64ths	32nds
METRIC AND ENGLISH								
425ME-130	51534	130 mm	0-3¼″ or 0-96 mm	¼-4″ or 6-100 mm	1⅜″ or 36 mm	.236″ or 6 mm	64ths & ½ mm	mm

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered

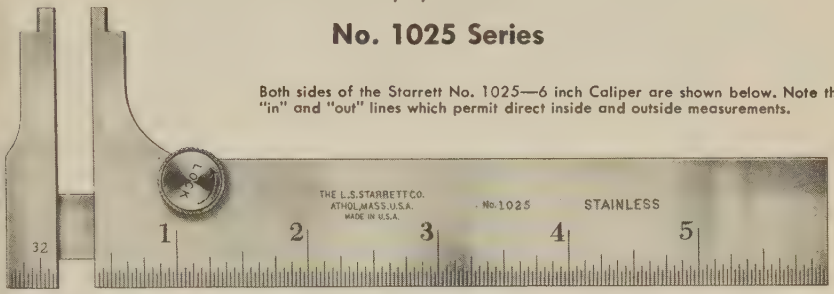
Packed One in a Box

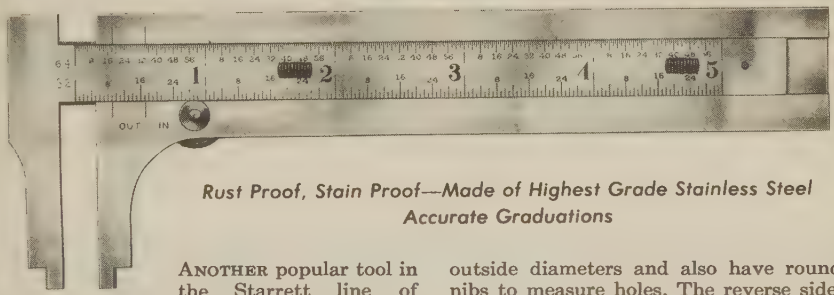
Stainless Steel Pocket Slide Calipers

3, 5, 6 Inch

No. 1025 Series

Both sides of the Starrett No. 1025—6 inch Caliper are shown below. Note the "in" and "out" lines which permit direct inside and outside measurements.





Rust Proof, Stain Proof—Made of Highest Grade Stainless Steel
Accurate Graduations

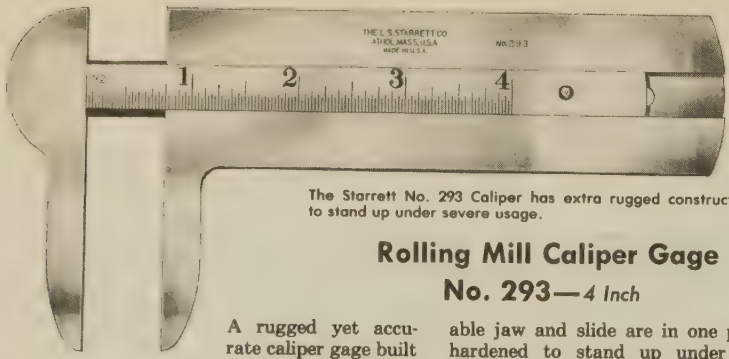
ANOTHER popular tool in the Starrett line of pocket slide calipers. Rust-proof and stain-proof with a permanently bright finish since this quality tool is made of highest grade Stainless Steel. Available in 3 inch, 5 inch and 6 inch sizes.

Both inside and outside diameters can be accurately measured with this rule in 64ths of an inch by means of graduations on the slide in conjunction with "outside" and "inside" lines on the stock. Jaws are designed with straight inside surfaces for measuring outside diameters and also have rounded nibs to measure holes. The reverse side of the stock is machine graduated with a handy six inch scale in 32nds of an inch.

Two knurled thumb pieces on the slide make it easy to open or close the jaws. The slide can be locked for any measurement by an improved, knurled clamping screw having a left-hand thread—a valuable feature as it may be locked by the thumb of the same hand in which the tool is held. A stop prevents the slide from being pulled out entirely.

Cat. No.	EDP No.	Size	Range		Depth of Jaws	Width of Nibs Closed	Graduations	
			Outside	Inside			Slide	Stock
1025-3	53122	3″	0-2⅛″	⅛-2¼″	11/16″	⅛″	64ths	32nds
1025-5	53123	5″	0-3¾″	¼-4″	17/16″	¼″	32nds & 64ths	32nds
1025-6	53124	6″	0-4¾″	¼-5″	17/16″	¼″	32nds & 64ths	32nds

Available With Attractive, Protective Case—Sent Without Case Unless Otherwise Ordered
Packed One in a Box



The Starrett No. 293 Caliper has extra rugged construction to stand up under severe usage.

Rolling Mill Caliper Gage

No. 293—*4 Inch*

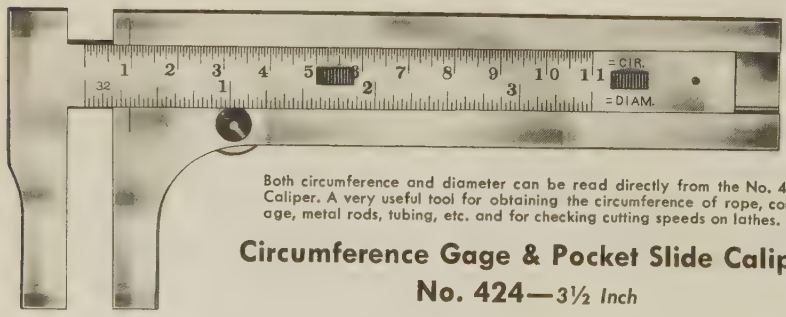
A rugged yet accurate caliper gage built to "take it" and specifically designed for measuring sheet and plate iron and steel, rods, rolls, etc. in rolling mills. Equally useful in steel warehouses, stock rooms and store rooms.

This gage has heavy-duty construction throughout and for extra strength the movable jaw and slide are in one piece. Jaws are hardened to stand up under severe usage. Smooth bright finish.

The slide is graduated with deep cut easy-to-read graduations in 32nds of an inch and the gage can be locked at any reading by a large diameter clamp nut. Note rounded end for tapping lightly to position.

Cat. No.	EDP No.	Size	Range Outside	Depth of Jaws	Graduations Slide
293	51325	4"	0-4"	2¼"	32nds

Packed One in a Box



Both circumference and diameter can be read directly from the No. 424 Caliper. A very useful tool for obtaining the circumference of rope, cordage, metal rods, tubing, etc. and for checking cutting speeds on lathes.

Circumference Gage & Pocket Slide Caliper

No. 424—3½ *Inch*

THIS extremely handy caliper gives direct readings of both circumference and diameter in a single setting. Especially useful for obtaining instant circumference and diameter measurements of rope, cordage, metal rods, pipe, tubing, etc. and for checking cutting speeds on lathe work. (Rule: Cutting Speed in Feet per Minute = Circumference ÷ 12 × Revolutions per Minute).

The upper edge of the slide is graduated from 0 to 11 circumference inches in 16ths and the lower edge from 0 to 3½ inches standard measurement in 32nds. The jaws are 1⅜ inches deep and therefore will caliper a cylinder up to 2¾ inches diameter.

			Range			Graduations	
Cat. No.	EDP No.	Size	Diameter	Circumference	Depth of Jaws	Diameter	Circumference
424	51527	3½"	0-3½"	0-11"	1⅜"	32nds	16ths

Packed One in a Box

Steel Rules—English Graduation

Starrett No. C604RE-6 Steel Rule—a typical rule in the line of Starrett Steel Rules which includes a complete range of sizes, types and graduations to meet every requirement.

★ **Complete Range of Sizes—From 1 to 144 inches.**

★ **All Types—Spring Tempered, Heavy Spring Tempered, Semi-Flexible and Full Flexible.**

★ **Graduations for Every Purpose—English, Metric and Shrink—Machine Divided with Distinctive Graduations.**

★ **Quick Reading Rules Furnished with New Easier Reading, Staggered Graduations.**

★ **Available with No-Glare, Long-Wearing SATIN-CHROME Finish—Pioneered by Starrett.**

Machine Divided to Highest Precision Standards

THE same craftsmanship that characterizes the entire line of Starrett Tools is found in Starrett Steel Rules. Highest quality steel plus uniform, dependable, highly accurate machine divided graduations have made them the standard of precision for good mechanics everywhere.

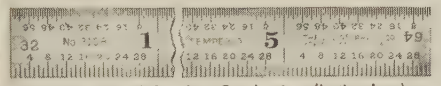
Starrett Steel Rules are machine divided on specially designed graduating machines to match Starrett Master Standards. These master standards are periodically checked with Government standards at the Bureau of Standards in Washington and all dividing equipment is also frequently checked to conform with the masters.

Such meticulous care in the maintenance of standards and the dividing process result in distinctive graduations of uniform width and depth that make Starrett Steel Rules easier to read and uniformly, highly accurate.

Made in all types, Spring Tempered, Heavy Spring Tempered, Semi-Flexible and Full Flexible—all styles of graduations, including English, Metric, Metric and English, Shrink, and special graduations—and all sizes from 1 to 144 inches, to meet every requirement. Also available in no-glare, hard-wearing, *multi-plate* SATIN-CHROME Finish, pioneered by Starrett.

For complete information on graduations and sizes, see the listings on the following pages.

QUICK READING GRADUATIONS



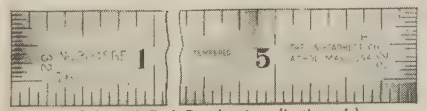
Rule with Quick Reading Graduations (both edges)

Rule with Aircraft Quick Reading Graduations (lower edge)

MANY Starrett Steel Rules are available with Starrett Quick-Reading Graduations—a very desirable feature that makes readings easier and faster. In addition to the inch numbers, the inch subdivisions are also numbered as illustrated at the left. Quick Reading Rules now furnished with new, easier reading, *staggered* graduations.

Aircraft Quick-Reading Graduations are available on Starrett Steel Rules with decimal graduations in 50ths or 100ths. This type of graduation is illustrated on the lower edge of the rule in the second cut at the left. Extremely popular in aircraft plants and all other shops using decimals.

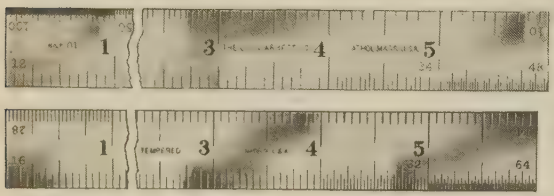
END GRADUATIONS



Rule with End Graduations (both ends)

END graduations are useful for measuring the depth and width of shoulders, recesses, grooves, etc. Graduated in 32nds of an inch on both ends of one side as shown at the left.

No. 1 Graduation



First Edge: 10ths-20ths-50ths-100ths

Front Side

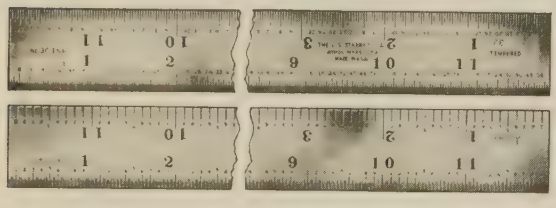
Second Edge: 12ths-24ths-48ths

Fourth Edge: 14ths-28ths

Reverse Side

Third Edge: 16ths-32nds-64ths

No. 3R* Graduation



First Edge: 32nds

Front Side

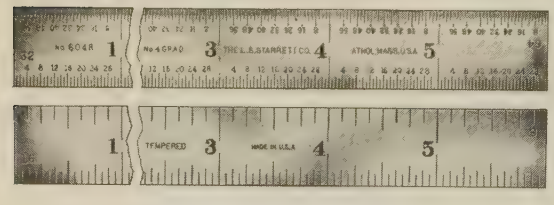
Second Edge: 64ths

Fourth Edge: 10ths

Reverse Side

Third Edge: 50ths

No. 4R* Graduation



First Edge: 64ths

Front Side

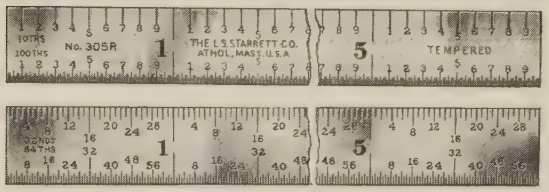
Second Edge: 32nds

Fourth Edge: 8ths

Reverse Side

Third Edge: 16ths

No. 5R* Graduation



First Edge: 10ths

Front Side

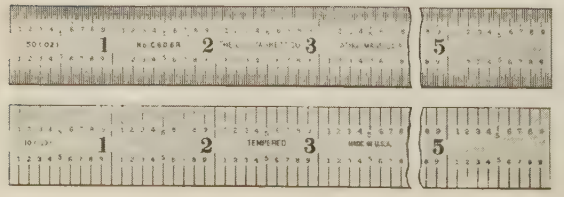
Second Edge: 100ths

Fourth Edge: 32nds

Reverse Side

Third Edge: 64ths

No. 6R* Graduation



First Edge: 50ths

Front Side

Second Edge: 50ths

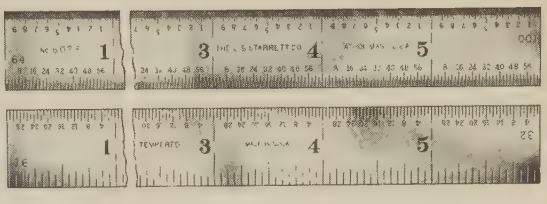
Fourth Edge: 10ths

Reverse Side

Third Edge: 10ths

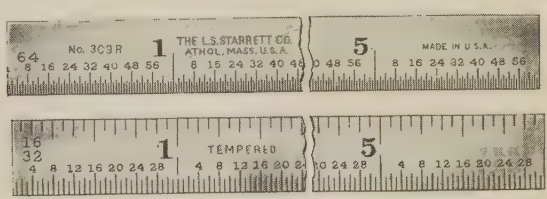
No. 7R* Graduation

First Edge: 100ths ➡
Front Side
Second Edge: 64ths ➡
Fourth Edge: 32nds ➡
Reverse Side
Third Edge: 16ths ➡



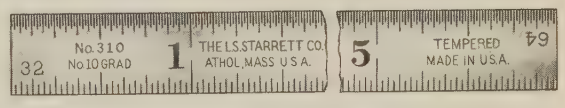
No. 9R* Graduation

First Edge: ➡
Front Side
Second Edge: 64ths ➡
Fourth Edge: 16ths ➡
Reverse Side
Third Edge: 32nds ➡



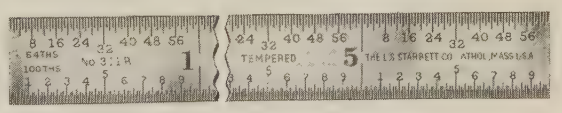
No. 10 Graduation

First Edge: 64ths ➡
Front Side
Second Edge: 32nds ➡



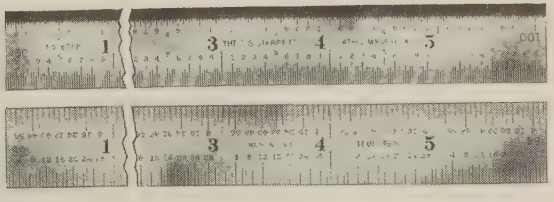
No. 11R* Graduation

First Edge: 64ths ➡
Front Side
Second Edge: 100ths ➡



No. 16R* Graduation

First Edge: 100ths ➡
Front Side
Second Edge: 50ths ➡
Fourth Edge: 64ths ➡
Reverse Side
Third Edge: 32nds ➡



*Suffix "R" designates Quick Reading graduations.

1 to 144 Inch Steel Rules—With Graduations in English Measure

Length	Cat. No.	EDP No.	Graduation	Width (approx.)	Thickness (approx.)	Type
1"	*C604R-1	56464	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1/2"	3/64"	Satin Chrome—Spring Tempered
2"	*C604R-2	56465	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1/2"	3/64"	Satin Chrome—Spring Tempered
3"	*C604R-3	56466	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	9/16"	3/64"	Satin Chrome—Spring Tempered
4"	*C604R-4	56467	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	5/8"	3/64"	Satin Chrome—Spring Tempered
	*610N-4	52693	No. 10—32nds one side and 64ths on reverse side	3/16"	3/64"	Spring Tempered
6"	*C601-6	52639	No. 1—10ths, 20ths, 50ths, 100ths; 12ths, 24ths, 48ths; 16ths, 32nds, 64ths; 14ths, 28ths	3/4"	3/64"	Satin Chrome—Spring Tempered
	*C303R-6	51334	No. 3R—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths	1/2"	1/64"	Satin Chrome—Full Flexible
	*C303SR-6	51335	No. 3R—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths	3/4"	1/50"	Satin Chrome—Semi-Flexible
	*C304SRE-6	51343	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths; End Grad. in 32nds both ends one side	3/4"	1/50"	Satin Chrome—Semi-Flexible
	*604R-6	52645	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	3/4"	3/64"	Spring Tempered
	*C604R-6	52678	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	3/4"	3/64"	Satin Chrome—Spring Tempered
	*C604RE-6	52660	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths; End Grad. in 32nds both ends one side	3/4"	3/64"	Satin Chrome—Spring Tempered
	*1604R-6	53210	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	3/4"	3/64"	Stainless Steel Hardened and Tempered
	*C305R-6	51347	No. 5R—Quick Reading 10ths, Aircraft Quick Reading 100ths, 32nds, 64ths	1/2"	1/64"	Satin Chrome—Full Flexible
	*C306R-6	51352	No. 6R, one side only—Quick Reading 10ths (.10) top edge, Aircraft Quick Reading 50ths (.02) bottom edge	1/2"	1/64"	Satin Chrome—Full Flexible
	*C606R-6	52652	No. 6R, both sides—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	3/4"	3/64"	Satin Chrome—Spring Tempered
	*C607R-6	52688	No. 7R—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths	3/4"	3/64"	Satin Chrome—Spring Tempered
	*C309R-6	51357	No. 9R—16ths and Quick Reading 32nds on one side; Quick Reading 64ths on reverse side	1/2"	1/64"	Satin Chrome—Full Flexible
	*1309R-6	53204	No. 9R—16ths and Quick Reading 32nds on one side; Quick Reading 64ths on reverse side	1/2"	1/64"	Stainless Steel Full Flexible
	*C310R-6	51368	No. 10R—Quick Reading 32nds and 64ths on one side only	1/2"	1/64"	Satin Chrome—Full Flexible
	*610N-6	52694	No. 10—32nds one side and 64ths on reverse side	3/16"	3/64"	Spring Tempered
	*C610N-6	52696	No. 10—32nds one side and 64ths on reverse side	3/16"	3/64"	Satin Chrome—Spring Tempered
	*611N-6	52700	No. 11—64ths on one side and 100ths on reverse side	3/16"	3/64"	Spring Tempered

(Continued on next page)

1 to 144 Inch Steel Rules—With Graduations in English Measure

Length	Cat. No.	EDP No.	Graduation	Width (approx.)	Thickness (approx.)	Type
6" (cont.)	*C316R-6	51374	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	1/2"	1/64"	Satin Chrome—Full Flexible
	*C616R-6	52701	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	3/4"	3/64"	Satin Chrome—Spring Tempered
12"	C601-12	52640	**No. 1**—10ths, 20ths, 50ths, 100ths; 12ths, 24ths, 48ths; 16ths, 32nds, 64ths; 14ths, 28ths	1"	3/64"	Satin Chrome—Spring Tempered
	C303SR-12	51336	**No. 3R**—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths	1"	1/40"	Satin Chrome—Semi-Flexible
	C304SRE-12	51344	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths; End Grad. in 32nds, both ends one side	1"	1/40"	Satin Chrome—Semi-Flexible
	604R-12	52647	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths	1"	3/64"	Spring Tempered
	C604R-12	52679	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths	1"	3/64"	Satin Chrome—Spring Tempered
	C604RE-12	52661	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths; End Grad. in 32nds both ends one side	1"	3/64"	Satin Chrome—Spring Tempered
	1604R-12	53211	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths	1"	3/64"	Stainless Steel Hardened and Tempered
	*C305R-12	51348	**No. 5R**—Quick Reading 10ths, Aircraft Quick Reading 100ths, 32nds, 64ths	1/2"	1/64"	Satin Chrome—Full Flexible
	*C306R-12	51353	**No. 6R**, one side only—Quick Reading 10ths (.10) top edge, Aircraft Quick Reading 50ths (.02) bottom edge	1/2"	1/64"	Satin Chrome—Full Flexible
	C606R-12	52653	**No. 6R**, both sides—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"	Satin Chrome—Spring Tempered
	C607R-12	52689	**No. 7R**—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths	1"	3/64"	Satin Chrome—Spring Tempered
	*C310R-12	56429	**No. 10R**—Quick Reading 32nds and 64ths on one side only	1/2"	1/64"	Satin Chrome—Full Flexible
	*610N-12	52695	**No. 10**—32nds one side and 64ths on reverse side	3/16"	3/64"	Spring Tempered
	*C316R-12	51375	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	1/2"	1/64"	Satin Chrome—Full Flexible
	C616R-12	52702	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	1"	3/64"	Satin Chrome—Spring Tempered
18"	C303SR-18	51337	**No. 3R**—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths	1"	1/40"	Satin Chrome—Semi-Flexible
	C604R-18	52680	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/8"	3/64"	Satin Chrome—Spring Tempered
	*C305R-18	51349	**No. 5R**—Quick Reading 10ths, Aircraft Quick Reading 100ths, 32nds, 64ths	3/4"	1/50"	Satin Chrome—Full Flexible
	C607R-18	52690	**No. 7R**—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths	1 1/8"	3/64"	Satin Chrome—Spring Tempered
	C310R-18	56430	**No. 10R**—Quick Reading 32nds and 64ths on one side only	3/4"	1/50"	Satin Chrome—Full Flexible
	*C316R-18	51376	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	3/4"	1/50"	Satin Chrome—Full Flexible

(Continued on next page)

1 to 144 Inch Steel Rules—With Graduations in English Measure

Length	Cat. No.	EDP No.	Graduation	Width (approx.)	Thickness (approx.)	Type
24"	C303SR-24	51338	No. 3R—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths	1"	1/40"	Satin Chrome—Semi-Flexible
	C304R-24	56645	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	3/4"	1/50"	Satin Chrome—Full Flexible
	C404R-24	51484	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/4"	1/10"	Satin Chrome—Heavy Spring Tempered
	C604R-24	52681	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/4"	3/64"	Satin Chrome—Spring Tempered
	*C305R-24	51350	No. 5R—Quick Reading 10ths, Aircraft Quick Reading 100ths, 32nds, 64ths	3/4"	1/50"	Satin Chrome—Full Flexible
	C607R-24	52691	No. 7R—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths	1 1/4"	3/64"	Satin Chrome—Spring Tempered
	C310R-24	56431	No. 10R—Quick Reading 32nds and 64ths on one side only	3/4"	1/50"	Satin Chrome—Full Flexible
	*C316R-24	51377	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	3/4"	1/50"	Satin Chrome—Full Flexible
	C416R-24	51509	No. 16R—Quick Reading 32nds, 64ths Aircraft Quick Reading 50ths, 100ths	1 1/4"	1/10"	Satin Chrome—Heavy Spring Tempered
36"	C404R-36	51485	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
	C604R-36	52682	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/4"	3/64"	Satin Chrome—Spring Tempered
	*C305R-36	51351	No. 5R—Quick Reading 10ths, Aircraft Quick Reading 100ths, 32nds, 64ths	3/4"	1/50"	Satin Chrome—Full Flexible
	C607R-36	56436	No. 7R—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths	1 1/4"	3/64"	Satin Chrome—Spring Tempered
	C310R-36	56432	No. 10R—Quick Reading 32nds and 64ths on one side only	3/4"	1/50"	Satin Chrome—Full Flexible
	*C316R-36	51378	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	3/4"	1/50"	Satin Chrome—Full Flexible
	C416R-36	51510	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
48"	C404R-48	51486	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
	C604R-48	52683	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/4"	3/64"	Satin Chrome—Spring Tempered
	C607R-48	56437	No. 7R—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths	1 1/4"	3/64"	Satin Chrome—Spring Tempered
	C310R-48	56433	No. 10R—Quick Reading 32nds and 64ths on one side only	3/4"	1/50"	Satin Chrome—Full Flexible
	C416R-48	51511	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
60"	C404R-60	51487	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
	C416R-60	51512	No. 16R—Quick Reading 32nds, 64ths Aircraft Quick Reading 50ths, 100ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
72"	C404R-72	51488	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered
	C416R-72	51513	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	1 1/2"	1/10"	Satin Chrome—Heavy Spring Tempered

(Continued on next page)

1 to 144 Inch Steel Rules—With Graduations in English Measure

Length	Cat. No.	EDP No.	Graduation	Width (approx.)	Thickness (approx.)	Type
96"	C404R-96	56191	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	$1^{11}/_{16}$"	$^{7}/_{64}$"	Satin Chrome—Heavy Spring Tempered
	C416R-96	56197	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	$1^{11}/_{16}$"	$^{7}/_{64}$"	Satin Chrome—Heavy Spring Tempered
120"	C404R-120	56192	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	$1^{11}/_{16}$"	$^{7}/_{64}$"	Satin Chrome—Heavy Spring Tempered
	C416R-120	56198	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	$1^{11}/_{16}$"	$^{7}/_{64}$"	Satin Chrome—Heavy Spring Tempered
144"	C404R-144	56193	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths	$1^{11}/_{64}$"	$^{7}/_{64}$"	Satin Chrome—Heavy Spring Tempered
	C416R-144	56199	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	$1^{11}/_{16}$"	$^{7}/_{64}$"	Satin Chrome—Heavy Spring Tempered

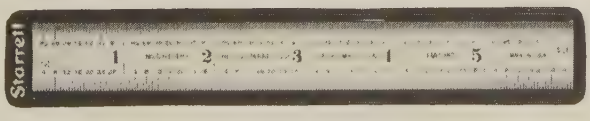
NOTE: Additional sizes with regular or Satin Chrome Finish available on special order.
NOTE: Prefix "C" designates Satin Chrome Finish.
Suffix "R" designates Quick Reading graduations.
Suffix "S" designates Semi-Flexible Type Rule.
Suffix "E" designates End Graduations also furnished.
Suffix "N" designates Narrow Type Rule.
NOTE: Also see pages 164 and 165 for Combination Square Blades.
NOTE: All No. C404R and C416R Rules furnished with hole in end for hanging.

ASTERISK (*) INDICATES RULES WITH SINGLE ROW OF INCH FIGURES.

RULES WITHOUT ASTERISK HAVE DOUBLE ROW OF INCH FIGURES. SEE PAGE 133.

Packed 1 to 12 Inch, Six in a Box; 18 to 144 Inch, One in a Package

Case for 6" Rules

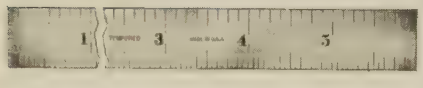


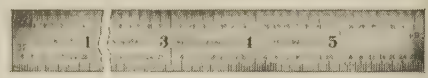
For added convenience and protection, all 6" and 150 mm rules in ½" and ¾" widths (except hook rules) are furnished at no extra cost in this attractive, protective case with see-through front.

Spring Tempered Steel Rules

1 to 48 Inch

No. 601, No. 604R, No. 604RE, No. 606R, No. 607R, No. 616R Series





Length	Regular		Satin Chrome		Width (approx.)	Thickness (approx.)	Graduation
	Cat. No.	EDP No.	Cat. No.	EDP No.			
6"	—	—	*C601-6	52639	3/4"	3/64"	No. 1—10ths, 20ths, 50ths, 100ths; 12ths, 24ths, 48ths; 16ths, 32nds, 64ths; 14ths, 28ths
12"	—	—	C601-12	52640	1"	3/64"	
1"	—	—	*C604R-1	56464	1/2"	3/64"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
2"	—	—	*C604R-2	56465	1/2"	3/64"	
3"	—	—	*C604R-3	56466	9/16"	3/64"	
4"	—	—	*C604R-4	56467	5/8"	3/64"	
6"	*604R-6	52645	*C604R-6	52678	3/4"	3/64"	
12"	604R-12	52647	C604R-12	52679	1"	3/64"	
18"	—	—	C604R-18	52680	1 1/8"	3/64"	
24"	—	—	C604R-24	52681	1 1/4"	3/64"	
36"	—	—	C604R-36	52682	1 1/4"	3/64"	
48"	—	—	C604R-48	52683	1 1/4"	3/64"	
6"	—	—	*C604RE-6	52660	3/4"	3/64"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths; End Grad. in 32nds both ends one side
12"	—	—	C604RE-12	52661	1"	3/64"	
6"	—	—	*C606R-6	52652	3/4"	3/64"	No. 6R, both sides—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side
12"	—	—	C606R-12	52653	1"	3/64"	
6"	—	—	*C607R-6	52688	3/4"	3/64"	No. 7R—16ths, Quick Reading 32nds, 64ths, Aircraft Quick Reading 100ths
12"	—	—	C607R-12	52689	1"	3/64"	
18"	—	—	C607R-18	52690	1 1/8"	3/64"	
24"	—	—	C607R-24	52691	1 1/4"	3/64"	
36"	—	—	C607R-36	56436	1 1/4"	3/64"	
48"	—	—	C607R-48	56437	1 1/4"	3/64"	
6"	—	—	*C616R-6	52701	3/4"	3/64"	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
12"	—	—	C616R-12	52702	1"	3/64"	

ASTERISK (*) INDICATES RULES WITH SINGLE ROW OF INCH FIGURES.

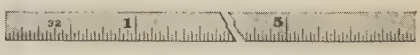
RULES WITHOUT ASTERISK HAVE DOUBLE ROW OF INCH FIGURES. SEE PAGE 133.

Packed: 1 to 12 inch, Six in a Box; 18 to 48 inch, One in a Package

Narrow Spring Tempered Steel Rules

4 to 12 Inch

No. 610N, No. 611N Series



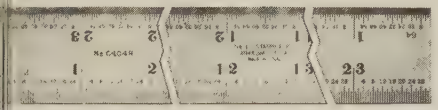
Length	Regular		Satin Chrome		Width (approx.)	Thickness (approx.)	Graduation
	Cat. No.	EDP No.	Cat. No.	EDP No.			
6"	**610N-6**	52694	**C610N-6**	52696	3/16"	3/64"	**No. 10**—32nds one side and 64ths on reverse side
12"	**610N-12**	52695	—	—	3/16"	3/64"	
6"	**611N-6**	52700	—	—	3/16"	3/64"	**No. 11**—64ths on one side and 100ths on reverse side

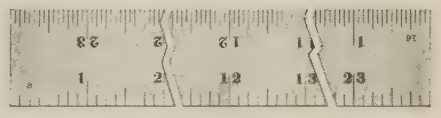
Packed: 6 to 12 inch, Six in a Box

Heavy Spring Tempered Steel Rules

24 to 144 Inch

No. C404R, No. C416R Series





Length	Satin Chrome		Width (approx.)	Thickness (approx.)	Graduation
	Cat. No.	EDP No.			
24"	**C404R-24**	51484	1 1/4"	1/10"	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths
36"	**C404R-36**	51485	1 1/2"	1/10"	
48"	**C404R-48**	51486	1 1/2"	1/10"	
72"	**C404R-72**	51488	1 1/2"	1/10"	
96"	**C404R-96**	56191	1 11/16"	7/64"	
120"	**C404R-120**	56192	1 11/16"	7/64"	
144"	**C404R-144**	56193	1 11/16"	7/64"	
24"	**C416R-24**	51509	1 1/4"	1/10"	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
36"	**C416R-36**	51510	1 1/2"	1/10"	
48"	**C416R-48**	51511	1 1/2"	1/10"	
72"	**C416R-72**	51513	1 1/2"	1/10"	
96"	**C416R-96**	56197	1 11/16"	7/64"	
120"	**C416R-120**	56198	1 11/16"	7/64"	
144"	**C416R-144**	56199	1 11/16"	7/64"	

NOTE: No. C404R and C416R Rules furnished with hole in end for hanging.

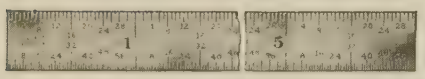
NOTE: These rules have double row of inch figures.

Packed: 24 to 144 inch, One in a Package

Full Flexible Steel Rules

6 to 48 Inch

No. 303R, No. 304R, No. 305R, No. 306R, No. 309R, No. 310R, No. 316R Series



Length	Satin Chrome		Width (approx.)	Thickness (approx.)	Graduation
	Cat. No.	EDP No.			
6"	*C303R-6	51334	1/2"	1/64"	**No. 3R**—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths
24"	C304R-24	56645	3/4"	1/50"	**No. 4R**—8ths, 16ths, Quick Reading 32nds and 64ths
6"	*C305R-6	51347	1/2"	1/64"	**No. 5R**—Quick Reading 10ths, Aircraft Quick Reading 100ths, 32nds, 64ths
12"	*C305R-12	51348	1/2"	1/64"	
18"	*C305R-18	51349	3/4"	1/50"	
24"	*C305R-24	51350	3/4"	1/50"	
36"	*C305R-36	51351	3/4"	1/50"	
6"	*C306R-6	51352	1/2"	1/64"	**No. 6R**, one side only—Quick Reading 10ths (.10) top edge, Aircraft Quick Reading 50ths (.02) bottom edge
12"	*C306R-12	51353	1/2"	1/64"	
6"	*C309R-6	51357	1/2"	1/64"	**No. 9R**—16ths and Quick Reading 32nds one side; Quick Reading 64ths on reverse side
6"	*C310R-6	51368	1/2"	1/64"	**No. 10R**—Quick Reading 32nds and 64ths on one side only
12"	*C310R-12	56429	1/2"	1/64"	
18"	C310R-18	56430	3/4"	1/50"	
24"	C310R-24	56431	3/4"	1/50"	
36"	C310R-36	56432	3/4"	1/50"	
48"	C310R-48	56433	3/4"	1/50"	
6"	*C316R-6	51374	1/2"	1/64"	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
12"	*C316R-12	51375	1/2"	1/64"	
18"	*C316R-18	51376	3/4"	1/50"	
24"	*C316R-24	51377	3/4"	1/50"	
36"	*C316R-36	51378	3/4"	1/50"	

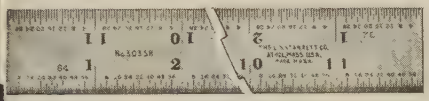
ASTERISK (*) INDICATES RULES WITH SINGLE ROW OF INCH FIGURES. RULES WITHOUT ASTERISK HAVE DOUBLE ROW OF INCH FIGURES. **SEE PAGE 133.**

Packed: 6 to 12 inch, Six in a Box; 18 to 48 inch, One in a Package

Semi-Flexible Steel Rules

6 to 24 Inch

No. C303SR, No. C304SRE Series



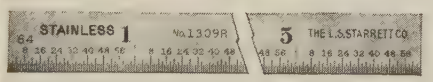
Length	Satin Chrome		Width (approx.)	Thickness (approx.)	Graduation
	Cat. No.	EDP No.			
6"	*C303SR-6	51335	3/4"	1/50"	No. 3R—Quick Reading 10ths, Aircraft Quick Reading 50ths, 32nds, 64ths
12"	C303SR-12	51336	1"	1/40"	
18"	C303SR-18	51337	1"	1/40"	
24"	C303SR-24	51338	1"	1/40"	
6"	*C304SRE-6	51343	3/4"	1/50"	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths; End. Grad. in 32nds both ends one side
12"	C304SRE-12	51344	1"	1/40"	

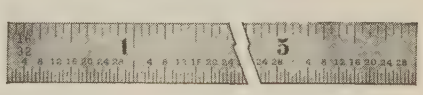
Packed: 6 to 12 inch, Six in a Box; 18 to 24 inch, One in a Package

Stainless Steel Rules

6 to 12 Inch

No. 1309R, No. 1604R Series





Length	Full Flexible		Hardened-Tempered		Width (approx.)	Thickness (approx.)	Graduation
	Cat. No.	EDP No.	Cat. No.	EDP No.			
6"	*1309R-6	53204	—	—	1/2"	1/64"	No. 9R—16ths and Quick Reading 32nds on one side; Quick Reading 64ths on reverse side
6"	—	—	*1604R-6	53210	3/4"	3/64"	No. 4R—8ths, 16ths, Quick Reading 32nds and 64ths
12"	—	—	1604R-12	53211	1"	3/64"	

ASTERISK (*) INDICATES RULES WITH SINGLE ROW OF INCH FIGURES. RULES WITHOUT ASTERISK HAVE DOUBLE ROW OF INCH FIGURES. **SEE PAGE 133.**

Packed: 6 to 12 inch, Six in a Box

FOR COMPLETE SPECIFICATIONS ON ALL ENGLISH RULES, SEE PAGES 128-131

Additional Sizes with Regular or SATIN-CHROME Finish Available on Special Order

Steel Rules—Metric Graduation

150 mm to 1000 mm (1 Meter) Lengths

Machine Divided—Distinctive Graduations

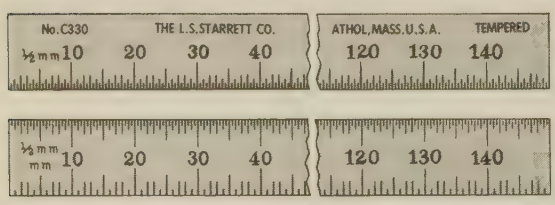
End graduations in mm exclusive with Starrett!

Starrett metric steel rules are made in 150 mm, 300 mm, 500 mm and 1000 mm lengths. The 150 mm length is the metric equivalent of the machinist's 6-inch English reading pocket rule. The 1000 mm or 1 meter length is slightly longer (39.37") than the familiar English yard stick. Rules with No. 31, No. 34 or No. 36 Graduation have both metric and English scales, a useful feature where dual dimensioning is used on shop drawings. Rules with No. 31 have all four edges graduated from the same end.

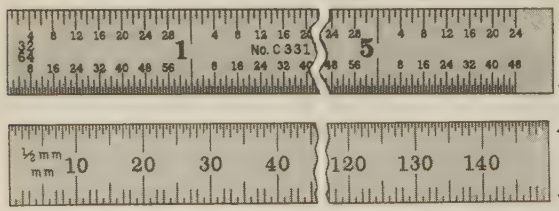
Special machine dividing processes plus rigid matching to master standards produce highly accurate graduations of uniform width and depth. Every tenth millimeter is numbered. Rules with end graduations are handy for measuring the depth and width of shoulders, recesses and grooves.

Starrett metric rules are made of high quality steel in spring temper, semi-flexible and full flexible types, all with no-glare, easy-reading satin chrome finish.

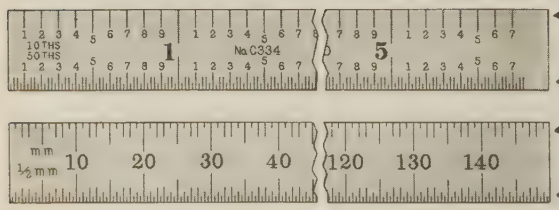
No. 30 Graduation



No. 31 Graduation

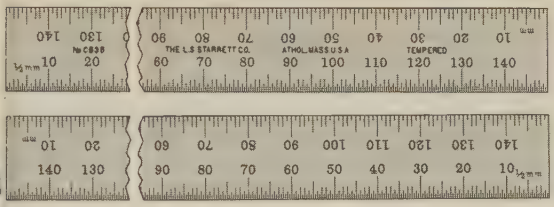


No. 34 Graduation



No. 35 Graduation

Reads both left-to-right and right-to-left—A Starrett feature!



← First Edge: mm

Front Side

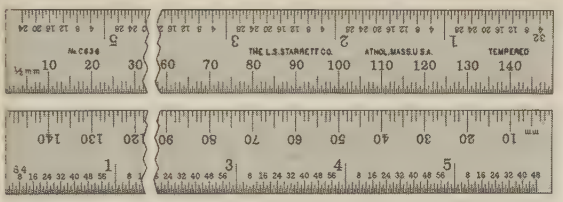
← Second Edge: 1/2 mm

← Fourth Edge: mm

Reverse Side

← Third Edge: 1/2 mm

No. 36 Graduation



← First Edge: 32nds

Front Side

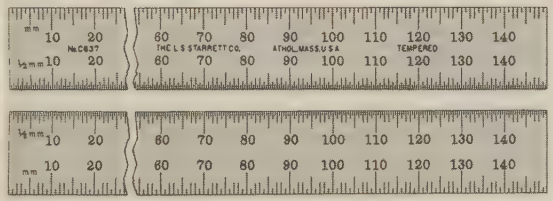
← Second Edge: 1/2 mm

← Fourth Edge: mm

Reverse Side

← Third Edge: 64ths

No. 37 Graduation



← First Edge: mm

Front Side

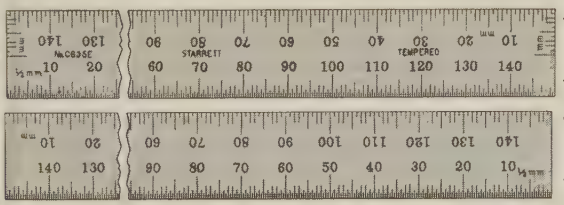
← Second Edge: 1/2 mm

← Fourth Edge: 1/2 mm

Reverse Side

← Third Edge: mm

No. 35E Graduation



← First Edge: mm

Front Side
End Graduations: mm

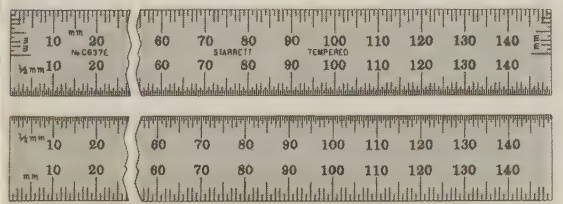
← Second Edge: 1/2 mm

← Fourth Edge: mm

Reverse Side

← Third Edge: 1/2 mm

No. 37E Graduation



← First Edge: mm

Front Side
End Graduations: mm

← Second Edge: 1/2 mm

← Fourth Edge: 1/2 mm

Reverse Side

← Third Edge: mm

Steel Rules—Metric Graduation—Cont.

Length	Cat. No.	EDP No.	Graduation	Width (approx.)	Thickness (approx.)	Type
150 mm	C330-150	51329	No. 30—½ mm one side; mm and ½ mm on reverse	12.7 mm	0.4 mm	Full Flexible
	C331-150*	51331	No. 31—32nds and 64ths on one side; mm and ½ mm on reverse. All four edges graduated from same end.	12.7 mm	0.4 mm	Full Flexible
	C334-150*	56262	No. 34—mm and ½ mm one side; quick reading 10ths (.10) and aircraft quick reading 50ths (.02) on reverse	12.7 mm	0.4 mm	Full Flexible
	635N-150	70164	No. 35—mm One Edge and ½ mm One Edge on Reverse	4.8 mm	1.2 mm	Spring Tempered
	C635-150	52630	No. 35—mm and ½ mm both sides	19.1 mm	1.2 mm	Spring Tempered
	C635E-150	55968	No. 35E—mm and ½ mm both sides; mm on both ends one side	19.1 mm	1.2 mm	Spring Tempered
	C636ME-150*	52634	No. 36—32nds and ½ mm one side; 64ths and mm on reverse	19.1 mm	1.2 mm	Spring Tempered
	C636EM-6**	57064	No. 36—32nds and ½ mm one side; 64ths and mm on reverse	19.1 mm	1.2 mm	Spring Tempered
	C637-150	56049	No. 37—mm and ½ mm both sides	19.1 mm	1.2 mm	Spring Tempered
	C637E-150	55969	No. 37E—mm and ½ mm both sides; mm on both ends one side	19.1 mm	1.2 mm	Spring Tempered
300 mm	C330-300	51330	No. 30—½ mm one side; mm and ½ mm on reverse	12.7 mm	0.4 mm	Full Flexible
	C331-300*	51332	No. 31—32nds and 64ths on one side; mm and ½ mm on reverse. All four edges graduated from same end.	12.7 mm	0.4 mm	Full Flexible
	C334-300*	56696	No. 34—mm and ½ mm one side; quick reading 10ths (.10) and aircraft quick quick reading 50ths (.02) on reverse	12.7 mm	0.4 mm	Full Flexible
	C335S-300	56048	No. 35—mm and ½ mm both sides	25.4 mm	0.6 mm	Semi-Flexible
	C635-300	52631	No. 35—mm and ½ mm both sides	25.4 mm	1.2 mm	Spring Tempered
	C636-300	52635	No. 36—32nds and ½ mm one side; 64ths and mm on reverse	25.4 mm	1.2 mm	Spring Tempered
500 mm	C334-500*	56697	No. 34—mm and ½ mm one side; quick reading 10ths (.10) and aircraft quick reading 50ths (.02) on reverse	19.1 mm	0.5 mm	Full Flexible
	C635-500	52632	No. 35—mm and ½ mm both sides	28.6 mm	1.2 mm	Spring Tempered
	C636-500*	52636	No. 36—32nds and ½ mm one side; 64ths and mm on reverse	28.6 mm	1.2 mm	Spring Tempered
1000 mm (1 meter)	C334-1000*	56698	No. 34—mm and ½ mm one side; quick reading 10ths (.10) and aircraft quick reading 50ths (.02) on reverse	19.1 mm	0.5 mm	Full Flexible
	C635-1000	52633	No. 35—mm and ½ mm both sides	31.8 mm	1.2 mm	Spring Tempered
	C636-1000*	52637	No. 36—32nds and ½ mm one side; 64ths and mm on reverse	31.8 mm	1.2 mm	Spring Tempered

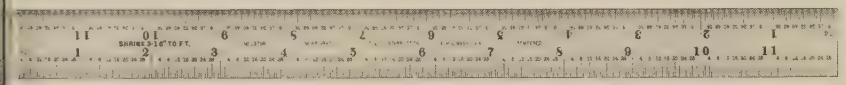
*English graduated edges are 5¾" long on 150 mm rules; 11¾" long on 300 mm rules; 19½" long on 500 mm rules; and 39¼" long on 1000 mm rules.

**English graduated edges are 6" long. Metric graduations are 150 mm with blank end.

Packed: 150 mm and 300 mm, Six in a Box; 500 mm and 1000 mm, One in a Package

12 to 24 Inch Steel Rules With Graduations in Shrink Measure

Machine Divided—Distinctive Graduations



SPRING TEMPERED STEEL — SATIN CHROME FINISH

Shrink rules are for laying out wood and metal patterns and core boxes for casting metals. Graduated to give shrink allowances directly, they come in 12" and 24" lengths with shrinks from 1/16" to 3/8" per foot. The average shrinkage figures, right, are for metals cast with uniform sections under normal conditions. In using them, it should be remembered that the size and shape of castings must be considered since thick castings have less shrink and thin castings more shrink than the figures given.

Average Shrinkage of Castings

Cast Iron	1/8" per ft.
Malleable Iron	1/8" per ft.
Steel	1/4" per ft.
Brass	3/16" per ft.
Copper	3/16" per ft.
Aluminum	3/16" per ft.
Lead	5/16" per ft.
Zinc	5/16" per ft.
Britannia	1/32" per ft.
Tin Alloys	1/12" per ft.

Length	Cat. No.	EDP No.	Shrink Per Foot	Shrink Graduation	Width (approx.)	Thickness (approx.)
12"	C100A-12	50452	1/16"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"
	C100C-12	50454	1/10"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"
	C374-12	51430	1/10"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C100E-12	50456	1/8"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"
	C370-12	51428	1/8"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C100R-12	50464	5/32"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"
	C389-12	51473	5/32"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C100F-12	50458	3/16"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"
	C375-12	51432	3/16"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C376-12	51434	7/32"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C100G-12	50460	1/4"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"

(Continued on next page)

12 to 24 Inch Steel Shrink Rules

SPRING TEMPERED STEEL — SATIN CHROME FINISH

Length	Cat. No.	EDP No.	Shrink Per Foot	Shrink Graduation	Width (approx.)	Thickness (approx.)
12" Cont.	C377-12	51435	1/4"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C378-12	51437	9/32"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C100H-12	50462	5/16"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1"	3/64"
	C368-12	51424	5/16"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
	C369-12	51426	3/8"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1"	3/64"
24"	C100A-24	50453	1/16"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C100C-24	50455	1/10"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C374-24	51431	1/10"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"
	C100E-24	50457	1/8"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C370-24	51429	1/8"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"
	C100R-24	50465	5/32"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C389-24	51474	5/32"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"
	C100F-24	50459	3/16"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C375-24	51433	3/16"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"
	C100G-24	50461	1/4"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C377-24	51436	1/4"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"
	C100H-24	50463	5/16"	No. 6R—Aircraft Quick Reading 50ths (.02) both edges one side, Quick Reading 10ths (.10) both edges opposite side	1 1/4"	3/64"
	C368-24	51425	5/16"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"
	C369-24	51427	3/8"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths	1 1/4"	3/64"

NOTE: Additional sizes with regular or satin chrome finish available on special order.

NOTE: Also see No. 62 Rule Holder on page 147. A very useful tool for patternmakers.

NOTE: These rules have double row of inch figures.

Packed 12 inch, Six in a Box; 24 inch, One in a Package

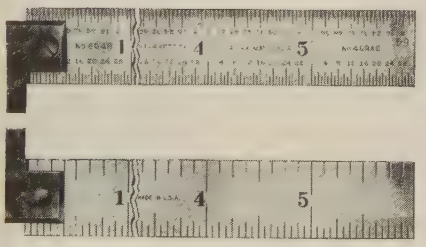
Adjustable Steel Hook Rules

6 to 12 Inch

No. DH604R Series

THIS improved Hook Rule features an adjustable double hook that can be shortened or extended on either side in relation to any one of the four graduations on the rule. Makes possible accurate measurements from shallow or deep shoulders and also permits setting calipers to any of the graduations. Hooks are hardened and may be adjusted or removed entirely by a slight turn of the eccentric stud.

Steel Hook Rules with Reversible Hook

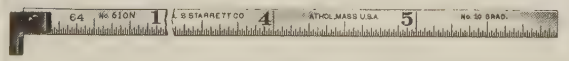


6 to 72 Inch

No. H604R and H404R Series

A VERY convenient Hook Rule that permits accurate measurements even when the user cannot see if the rule is even with the measuring edge. Especially useful for measuring from round corners, through hubs, for setting inside calipers, etc. The single hook is hardened and may be reversed or removed entirely by a slight turn of the eccentric stud.

Narrow Hook Rules with Reversible Hook



6 to 12 Inch

No. H610N Series

THESE useful Hook Rules are similar to No. H604R Rules described above but have a narrow blade only 3/16 inch wide which permits measurements through holes as small as 11/32 in. diameter. Hooks are hardened and may be reversed or removed by a partial turn of the eccentric stud.

SEE COMPLETE SPECIFICATIONS NEXT PAGE

Steel Hook Rules

6 to 72 Inch

Cat. No.	EDP No.	Length	Width (approx.)	Thickness (approx.)
DH604R-6	52662	6"	3/4"	3/64"
DH604R-12	52664	12"	1 "	3/64"
H604R-6	52667	6"	3/4"	3/64"
H604R-12	52669	12"	1 "	3/64"
H610N-6	52697	6"	3/16"	3/64"
H610N-12	52698	12"	3/16"	3/64"

Satin Chrome Hook Rules

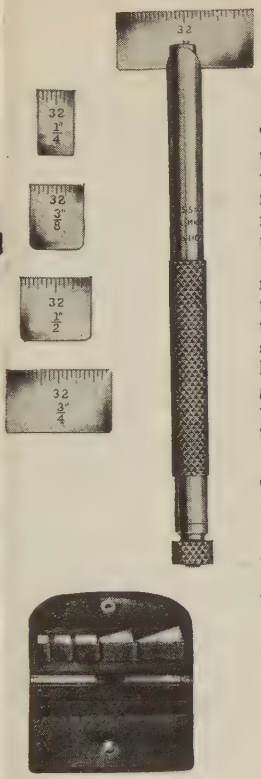
Cat. No.	EDP No.	Length	Width (approx.)	Thickness (approx.)
CD604R-6	52665	6"	3/4"	3/64"
CD604R-12	52666	12"	1 "	3/64"
CH604R-6	52673	6"	3/4"	3/64"
CH604R-12	52674	12"	1 "	3/64"
CH604R-18	52675	18"	1 1/8"	3/64"
CH604R-24	52676	24"	1 1/4"	3/64"
CH604R-36	52677	36"	1 1/4"	3/64"
CH610N-6	52699	6"	3/16"	3/64"

Cat. No.	EDP No.	Cat. No.	EDP No.	Length	Width (approx.)	Thickness (approx.)
CH404R-24	51494	CH416R-24	51519	24"	1 1/4"	1/10"
CH404R-36	51495	CH416R-36	51520	36"	1 1/2"	1/10"
CH404R-48	51496	CH416R-48	51521	48"	1 1/2"	1/10"
CH404R-72	51498	CH416R-72	51523	72"	1 1/2"	1/10"
CH404R-96	56474	CH416R-96	56477	96"	1.675"	.105"
CH404R-120	56475	CH416R-120	56478	120"	1.675"	.105"
CH404R-144	56476	CH416R-144	56479	144"	1.675"	.105"

NOTE: The above Hook Rules have graduations and tempers as follows:

Cat. No.	Graduation	Type
DH604R	No. 4R—8ths, 16ths, Q.R. 32nds, 64ths	Spring Tempered
CH604R	No. 4R—8ths, 16ths, Q.R. 32nds, 64ths	Spring Tempered
H610N	No. 10—32nds one side, 64ths reverse side	Spring Tempered
CH416R	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths	Heavy Spring Tempered

Rules 6 to 12 inches long packed three in a box; 18 to 144 inches, one in a package



Tempered Steel Rules with Holder

¼, ⅜, ½, ¾, 1 Inch

No. 423

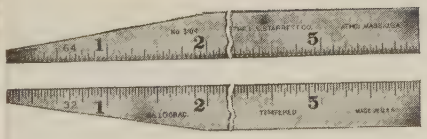
This set of five small rules together with a new improved holder is extremely useful for measurements in confined or hard-to-reach locations which prevent use of ordinary rules. They are especially suitable for measuring grooves, short shoulders, recesses, keyways, etc., in general machining operations on shapers and millers for example, as well as tool and die work.

The rules are easily inserted in the slotted end of the holder and are rigidly clamped in place by a slight turn of the knurled nut at the end of the handle. Two slots are provided permitting the rules to be held in the holder at 30 or 45 degrees, either square in a slot or tipped to one side. Thicknesses up to 1/16 inch can be clamped in either slot. The holder, being approximately 4 inches long, has the necessary length for good reach and balance. Rules are made of thin spring tempered steel, with bright finish, and have highly accurate machine divided graduations. Complete set furnished in case.

Cat. No.	EDP No.	Description	Graduation, Each Rule
S423Z	51524	Set of 5 Rules with Holder	
423-1/4	70634	1/4" Rule Only	
423-3/8	70635	3/8" Rule Only	No. 10—32nds, one side and 64ths on reverse side
*423-1/2	70636	1/2" Rule Only	
423-3/4	70637	3/4" Rule Only	
*423-1	70638	1 " Rule Only	
110	50475	Holder Only	

*NOTE: ½ and 1 inch Rules also available with No. 12 graduation—50ths one side and 100ths on reverse side.

No. S423Z Set Furnished in Attractive, Protective Case
Packed One Set in a Box



Full Flexible Steel Rule With Tapered End

No. C310T-6—*6 Inch*

This rule is a favorite with all mechanics since its tapered end permits measuring inside of small holes, narrow slots, grooves, recesses, etc. The rule has a taper from ½ inch width at the 2 inch graduation to 1/8 inch width at the end.

Accurate, distinctive, machine-divided graduations in 32nds on one side and 64ths on the reverse side with graduations always in a normal easy-to-read position. Made of fine, spring tempered steel, satin chrome finish.

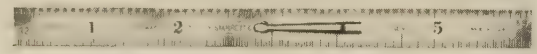
Cat. No.	EDP No.	Length	Graduation	Width (approx.)	Thickness (approx.)	Type
C310T-6	56700	6"	No. 10—32nds one side, 64ths, on reverse side	½"*	1/64"	Full Flexible

*NOTE: End tapers to 1/8 inch wide.

Packed Six in a Box

Full Flexible Steel Rule with Pocket Clip

No. C310K-6—*6 Inch*



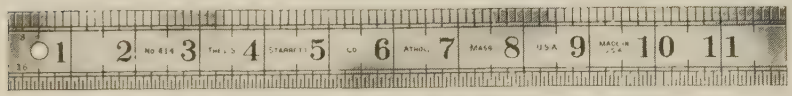
Here's an extremely useful rule designed for mechanics who use a rule many times a day. Consists of a 6 inch rule having a special clip which keeps the rule safely in the pocket and prevents it from falling out and being lost. Rule is made of tempered full flexible steel and has accurate machine divided graduations in 32nds on one edge and 64ths on the opposite edge, satin chrome finish.

Cat. No.	EDP No.	Length	Graduation	Width (approx.)	Thickness (approx.)	Type
C310K-6	56701	6"	No. 10—32nds,64ths	1/2"	1/64"	Full Flexible

Packed Six in a Box

Tempered Steel General Utility Rules—English Pattern

No. 414 Series—*1 to 6 Feet*



THESE tempered steel rules are designed to meet the needs of schools and shops, woodworkers, tinsmiths, metal-workers, bench work, etc. where a general utility rule of English pattern is required. Markings are heavier than conventional machine divided rules and easy to read. The two edges on both sides are graduated, the upper edges in 8ths and the lower edges in 16ths of an inch. 1/4" hole in one end.

Cat. No.	EDP No.	Length	Graduations—Both Sides	Width (approx.)	Thickness (approx.)
414-1	51499	1 ft.	8ths, 16ths	1 1/4"	1/16"
414-2	51500	2 ft.	8ths, 16ths	1 1/4"	1/16"
414-3	51501	3 ft.	8ths, 16ths	1 1/4"	1/16"
414-4	51502	4 ft.	8ths, 16ths	1 1/4"	1/16"
414-6	51503	6 ft.	8ths, 16ths	1 1/4"	1/16"

One foot Rule Packed One in a Package, Six to Box;
All Other Sizes One in a Package

Tempered Steel Folding Rule

With Circumference Measurement

No. 471—*Two Feet*

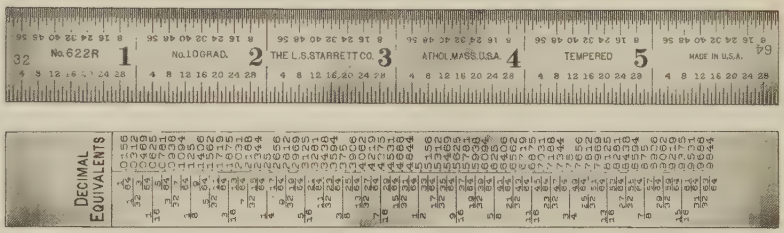
TINSMITHS and other mechanics can use this rule to good advantage because it measures diameters up to 24 inches as well as the equivalent circumference measurement in direct reading circumference inches up to 75 inches. Entirely eliminates need for circumference calculations.

Made of fine spring tempered steel 3/4 inch wide, approximately 1/32 inch thick, and jointed at the center with two 12 inch folds. Accurately graduated on one side with circumference inches in 8ths on one edge and standard 8ths on opposite edge; 16th graduations on reverse side.

Cat. No.	EDP No.	Length	Graduation	Width (approx.)	Thickness (approx.)	Type
471	52483	2 ft.	8ths and circumference 8ths on one side; 16ths on reverse side	3/4"	1/32"	Spring Tempered

Packed Six in a Box

Tempered Steel Rule with Decimal Equivalents
No. C622R-6—*6 Inch*

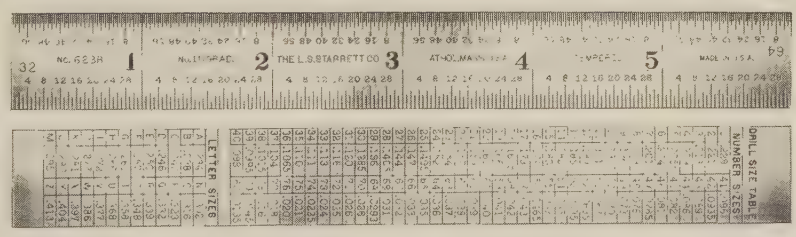


Every mechanic should have one of these extremely handy 6 inch rules. One side of the rule has accurate, machine divided, distinctive graduations in both Quick Reading 32nds and 64ths and the reverse side a highly legible table of fractions and decimal equivalents. Made of finest Spring Tempered steel, Satin Chrome finish.

Cat. No.	EDP No.	Length	Graduation	Width (approx.)	Thickness (approx.)	Type
C622R-6	56660	6"	No. 10R—Q. R. 32nds and 64ths one side and decimal equivalents on reverse side	3/4"	3/64"	Spring Tempered Satin Chrome

Packed Six in a Box

Tempered Steel Rule with Letter and Number Drill Sizes
No. C623R-6—*6 Inch*

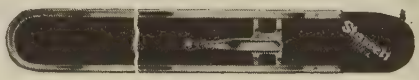


Another good practical shop rule. One side has accurate machine divided graduations in 32nds and 64ths with Quick Reading figures. The reverse side shows letter sizes of drills from A to Z with corresponding diameters in thousandths and also number sizes from 1 to 80 with diameters in thousandths. 6 inches long, 3/4 inch wide and 3/64 inch thick. Made of fine Spring Tempered steel, Satin Chrome finish.

Cat. No.	EDP No.	Length	Graduation	Width (approx.)	Thickness (approx.)	Type
C623R-6	56661	6"	No. 10R—Q. R. 32nds and 64ths one side and letter and number drill sizes on reverse side	3/4"	3/64"	Spring Tempered Satin Chrome

Packed Six in a Box

Rule Cases with Clip—*6 Inch*



A leather-like case with pocket clip for 6 inch steel rules. Rounded metal-bound edges prevent pocket from becoming worn and torn by rule corners.

Cat. No.	EDP No.	Description
1612	55433	Case with Clip, for ½" wide 6" Rules
1634	55434	Case with Clip, for ¾" wide 6" Rules

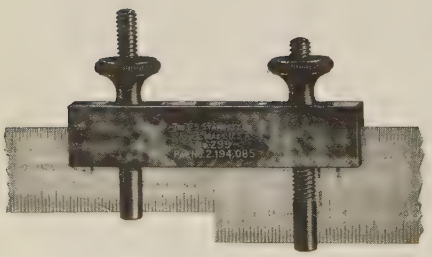
Key Seat Clamps
No. 298

These key seat clamps convert steel rules, combination square blades and straight edges into key seat rules for laying out keyways and scribing parallel lines on round work. Can be easily attached or removed. Made of steel, case hardened and accurately ground. Available in pairs only.

Cat. No.	EDP No.	Description
298	51327	$1\frac{1}{32}$" long x $\frac{7}{16}$" wide; $\frac{7}{64}$" slot width

Packed 1 Pair in a Box; 6 Boxes in a Carton

No. 299 Rule Clamp



Packed Four in a Box

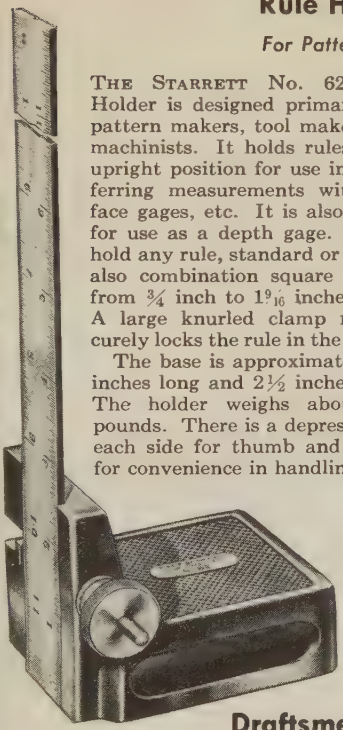
THIS useful tool is used to clamp two steel rules together, end to end, making one long rule for measuring lengths longer than can be measured with a single rule. Since the clamp bolts have independent adjustment, the Rule Clamp will hold rules of the same or different widths up to 1¼ inches. This clamp is especially valuable to mechanics whose tool chests will not hold rules over 12 inches long.

Cat. No.	EDP No.	Capacity
299	51328	Holds Steel Rules up to 1¼" wide

Also See Index for Straight Edges, T-Squares, Protractors, Universal Dividers, Pencil Dividers, Trammels and other Useful Tools.

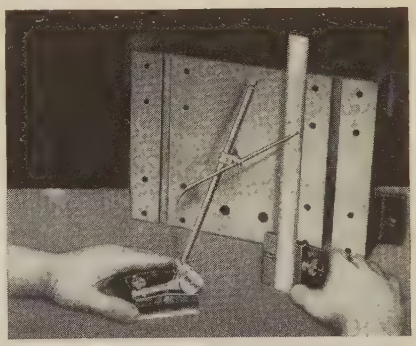
Rule Holder No. 62

For Pattern Makers and Machinists



THE STARRETT No. 62 Rule Holder is designed primarily for pattern makers, tool makers and machinists. It holds rules in an upright position for use in transferring measurements with surface gages, etc. It is also handy for use as a depth gage. It will hold any rule, standard or shrink, also combination square blades, from 3/4 inch to 1 9/16 inches wide. A large knurled clamp nut securely locks the rule in the holder.

The base is approximately 3 1/8 inches long and 2 1/2 inches wide. The holder weighs about 1 1/2 pounds. There is a depression on each side for thumb and fingers for convenience in handling.



Transferring measurements by means of a Starrett Surface Gage used in conjunction with a 12 inch rule and the Starrett No. 62 Rule Holder is illustrated above.

Cat. No.	EDP No.	Capacity
62	50304	Holds Steel Rules 3/4 to 1 9/16" wide

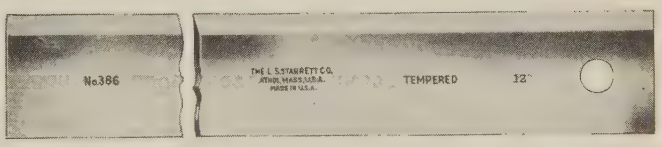
Packed One in a Box

Draftsmen's Steel Straight Edges

12 to 72 Inch

No. 386 Series

No. 386 Series Nickel Plated Beveled One Edge Only



THESE STARRETT Straight Edges are made especially for draftsmen and will be found highly useful. Available in lengths up to 72 inches long, all having a convenient hole at one end for hanging up.

No. 386 Straight Edges are nickel plated with an attractive no-glare finish.

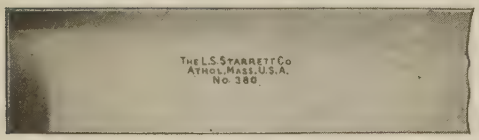
Cat. No.	EDP No.	Size	Width Approx.	Thickness Approx.
386-12	51462	12"	1 1/2"	5/64"
386-24	51463	24"	1 1/2"	5/64"
386-36	51464	36"	1 3/4"	3/32"
386-48	51465	48"	2 "	3/32"
386-72	51467	72"	2 1/2"	7/64"

Packed One in a Package

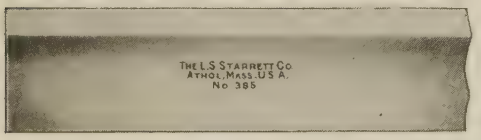
Steel Straight Edges

12 to 72 Inch

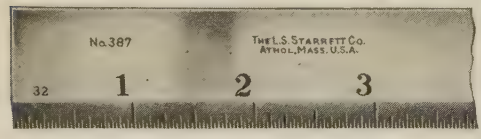
No. 380—No. 385—No. 387 Series



No. 380 Series
Not Beveled
Not Graduated



No. 385 Series
Beveled One Edge Only
Not Graduated



No. 387 Series
Graduated in 32nds
and Beveled
One Edge Only

STARRETT Straight Edges are precision made of fine tool steel to rigid Starrett standards. Ground all over and finely finished. These Straight Edges are unexcelled for drawing or scribing straight lines and checking surfaces for straightness.

No. 380 and No. 385 Straight Edges in sizes 36″ and longer are marked with arrows at two suspension points and should be suspended at these two points to minimize deflection caused by their length and weight.

No. 380 Series Not Beveled—Not Graduated Catalog No.	EDP No.	No. 385 Series Beveled One Edge Only—Not Graduated Catalog No.	EDP No.	No. 387 Series Graduated and Beveled One Edge Only Catalog No.	EDP No.	Size	Width Approx.	Thickness Approx.
380-12	51438	385-12	51455	387-12	51468	12″	$1\frac{13}{32}$″	$\frac{11}{64}$″
380-18	51439	385-18	51456	387-18	51469	18″	$1\frac{13}{32}$″	$\frac{11}{64}$″
380-24	51440	385-24	51457	387-24	51470	24″	$1\frac{13}{32}$″	$\frac{11}{64}$″
380-36	51441	385-36	51458	387-36	51471	36″	$2\frac{13}{32}$″	$\frac{7}{32}$″
380-48	51442	385-48	51459	387-48	51472	48″	$2\frac{13}{32}$″	$\frac{7}{32}$″
—	—	385-60	51460	—	—	60″	$3\frac{5}{32}$″	$\frac{9}{32}$″
380-72	51444	385-72	51461	—	—	72″	$3\frac{5}{32}$″	$\frac{9}{32}$″

NOTE: Also can be furnished in pairs when two are wanted of the same width—at extra charge.

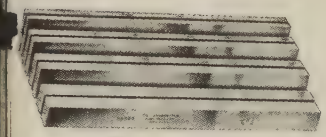
Packed One in a Package

Steel Parallels

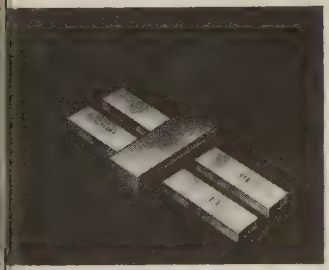
Hardened and Ground

⅛ x 1 to ⅜ x ¾ Inch

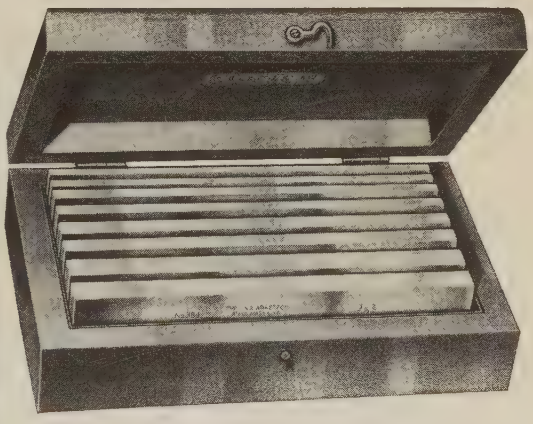
No. 384 Series



Starrett Steel Parallels are furnished in pairs as shown above in 8 different sizes listed below.



Surface grinding bottom face of workpiece parallel with slot using No. 384H Parallels.



No. S384K Set of four pairs of Parallels in protective case.

STARRETT No. 384 Steel Parallels are hardened and ground to close limits. Indispensable for inspection and layout work or for various setups on drill presses, milling and grinding machines, shapers, etc. They are made from a special grade of tool steel hardened and accurately ground on the four sides. In tool rooms or machine shops one or more pairs of these parallels will be of great value. Made in 6-inch length only. Available in pairs or in complete sets in cases as listed below.

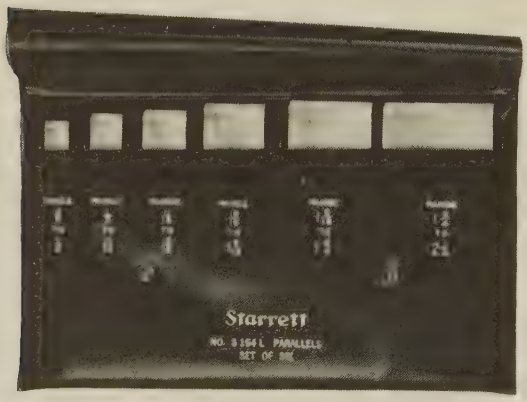
Cat. No.	EDP No.	Length	Thickness	Width	Cat. No.	EDP No.	Length	Thickness	Width
384A (pair)	51445	6"	⅛"	1 "	384E (pair)	51449	6"	¼"	¾"
384B (pair)	51446	6"	⅛"	1 3/16"	384F (pair)	51450	6"	¼"	1 "
384C (pair)	51447	6"	3/16"	⅞"	384G (pair)	51451	6"	⅜"	½"
384D (pair)	51448	6"	3/16"	1 ⅛"	384H (pair)	51452	6"	⅜"	¾"
S384JZ	51453	Set of 4 Pairs—sizes, A, C, E, G—in Case							
S384KZ	51454	Set of 4 Pairs—sizes, B, D, F, H—in Case							

Packed One Pair in a Box; also One Set in a Box

Adjustable Parallels

⅜ to 2¼ Inch
9.5 to 57.1 mm (Metric)

No. 154 Series

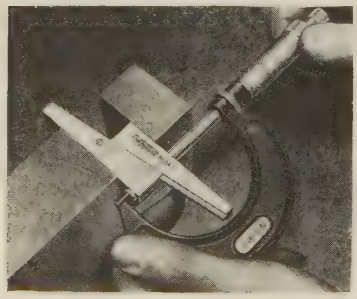


No. S154LZ Set of six Parallels in attractive protective case.

STARRETT Adjustable Parallels have a wide range of uses in layout, gaging, inspection work and for setups on various machine tools. Their adjustable feature makes it possible to adjust them to exact size by micrometer measurement and also permits use in place of several solid type parallels.

These parallels are useful as gages in checking the size of slots and openings. They can be quickly inserted in openings and expanded to size. The size of the slot can then be determined by measuring the parallels externally with a micrometer. They are also convenient for use in machine vises, for leveling up or adjusting work on setups of milling and grinding machines, shapers, planers, drill presses and for many other applications.

Parallels consist of two pieces which are dovetailed. They slide smoothly and can be easily adjusted. The smaller sizes A, B, and C, are locked by one screw while the larger sizes, D, E and F, have two lock screws. All parallels are 9/32 inch thick.



Mechanic checks inside measurement of slot using No. 154D Adjustable Parallel and No. 436—2" Micrometer.

Cat. No.	EDP No.	Range, English	Range, Metric	Length	Thickness
154A	50578	⅜– ½"	9.5–12.7 mm	1 ¾"	9/32"
154B	50579	½– 11/16"	12.7–17.5 mm	2 ⅛"	9/32"
154C	50580	11/16– 15/16"	17.5–23.8 mm	2 11/16"	9/32"
154D	50581	15/16–1 5/16"	23.8–33.3 mm	3 5/16"	9/32"
154E	50582	1 5/16–1 ¾"	33.3–44.4 mm	4 3/16"	9/32"
154F	50583	1 ¾–2 ¼"	44.4–57.1 mm	5 1/16"	9/32"
S154SZ	50584	Set of 4 Parallels—sizes A, B, C, D—in Case			
S154LZ	50586	Set of 6 Parallels—sizes A, B, C, D, E, F—in Case			

NOTE: Cases for Sets No. S154SZ and No. S154LZ also available separately.

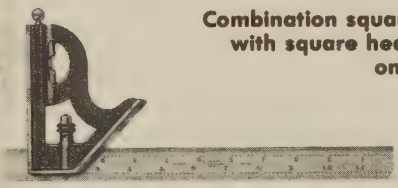
Packed One in a Box—Individually or Sets

Combination Squares, Combination Sets and Bevel Protractors

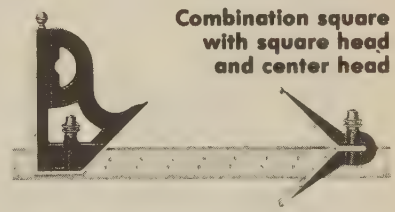
4 to 24 Inch—English, 150 to 600 mm—Metric,

300 mm and 11¾ Inch, 600 mm and 23½ Inch—Metric and English

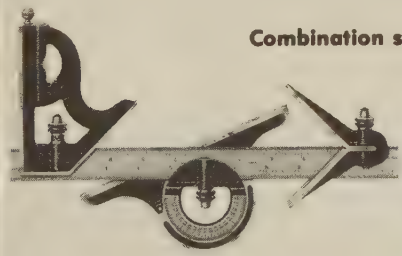
Combination square with square head only



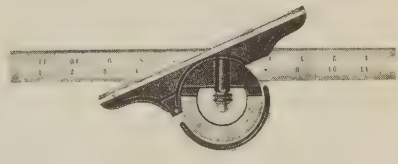
Combination square with square head and center head



Combination set



Bevel protractor



Combination squares consist of a machine divided, tempered steel rule or blade on which is mounted an adjustable square head or a square head in combination with a center head.

Combination sets come with a reversible or non-reversible protractor head in addition to the square head, center head and blade.

Bevel protractors are furnished with a reversible or non-reversible protractor head in combination with a blade.

Heads are available in two types — hardened forged steel with smooth black enamel finish or cast iron with black wrinkle finish. The heads slide on the blade in a central groove for free, easy adjustment. Blades come in choice of regular ground or no-glare satin chrome finish.

A reversible lock bolt allows the blade to be turned over or end-for-end without removing the bolt or nut and insures true alignment of blade and heads. The heads slide smoothly to any position along the blade and may be removed so the square head (which has a spirit level) may be used to level work. The blade may then be used as a separate rule.

Square heads have a precision ground 90° square face and a 45° miter face and come with hardened scriber and spirit level (except No. 33J Series and 4" sizes). Center heads have accurately machined faces.

Protractor heads have revolving turrets with direct reading double graduations a full 0 to 180° in opposite directions. This permits direct reading of angles above or below the blade. Protractor heads are furnished as reversible type with shoulders on both sides of the blade or non-reversible type with a single shoulder. Both types are equipped with a handy spirit level.

Combination Squares with Square Head Only

No. 11H and No. 33H Series—

4 to 24 Inch

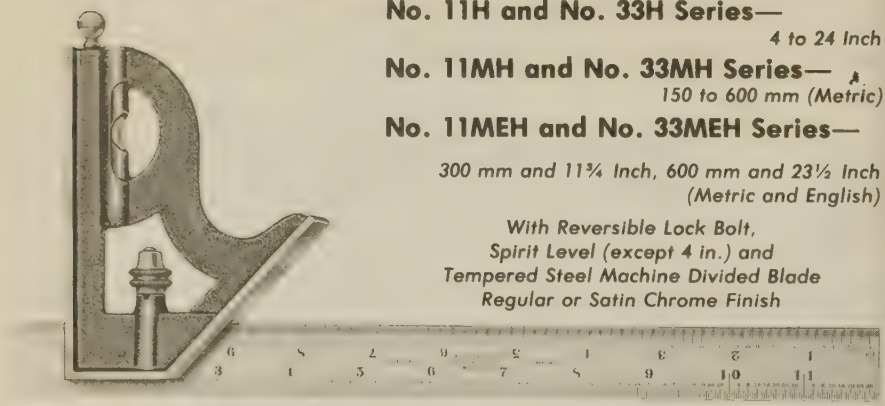
No. 11MH and No. 33MH Series—

150 to 600 mm (Metric)

No. 11MEH and No. 33MEH Series—

300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)

With Reversible Lock Bolt, Spirit Level (except 4 in.) and Tempered Steel Machine Divided Blade Regular or Satin Chrome Finish



No. 11H-12-4R

CAST HEAD

Black Wrinkle Finish

Cat. No.	EDP No.	Size	Blade	Graduation
11H-4-4R C11H-4-4R	50049 56360	4″	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
11H-6-4R C11H-6-4R	50051 56362	6″	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
11H-6-16R C11H-6-16R	50053 56364	6″	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11H-12-4R C11H-12-4R	50055 56366	12″	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
11H-12-16R C11H-12-16R	50057 56368	12″	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11H-18-4R C11H-18-4R	50059 56370	18″	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
11H-18-16R C11H-18-16R	50061 56372	18″	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11H-24-4R C11H-24-4R	50063 56374	24″	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
11H-24-16R C11H-24-16R	50065 56376	24″	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11MH-150 C11MH-150	56241 56380	150 mm	Regular Satin Chrome	mm and ½ mm both sides
11MH-300 C11MH-300	56243 56382	300 mm	Regular Satin Chrome	mm and ½ mm both sides
11MH-600 C11MH-600	56245 56384	600 mm	Regular Satin Chrome	mm and ½ mm both sides
11MEH-300 C11MEH-300	50067 56386	300 mm & 11¾″	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
11MEH-600 C11MEH-600	56121 56388	600 mm & 23½″	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side

(Continued on next page)

Combination Squares With Square Head Only

No. 11H and No. 33H Series—*4 to 24 Inch*

No. 11MH and No. 33MH Series—*150 to 600 mm (Metric)*

No. 11MEH and No. 33MEH Series—*300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)*

continued

FORGED AND HARDENED HEAD

Smooth Black Enamel Finish

Cat. No.	EDP No.	Size	Blade	Graduation
33H-4-4R C33H-4-4R	50203 56390	4"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33H-6-4R C33H-6-4R	50205 56392	6"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33H-6-16R C33H-6-16R	50207 56394	6"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33H-12-4R C33H-12-4R	50209 56396	12"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33H-12-16R C33H-12-16R	50211 56398	12"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33H-18-4R C33H-18-4R	50213 56400	18"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33H-18-16R C33H-18-16R	50215 56402	18"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33H-24-4R C33H-24-4R	50217 56404	24"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33H-24-16R C33H-24-16R	50219 56406	24"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33MH-150 C33MH-150	56247 56410	150 mm	Regular Satin Chrome	mm and ½ mm both sides
33MH-300 C33MH-300	56249 56412	300 mm	Regular Satin Chrome	mm and ½ mm both sides
33MH-600 C33MH-600	56251 56414	600 mm	Regular Satin Chrome	mm and ½ mm both sides
33MEH-300 C33MEH-300	50221 56416	300 mm & 11¾"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
33MEH-600 C33MEH-600	50237 56418	600 mm & 23½"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side

Packed One in a Box

For Separate Parts and Attachments, See Pages 161-164.

Combination Squares With Square Head and Center Head

No. 11HC and No. 33HC Series—*4 to 24 Inch*

No. 11MHC and No. 33MHC Series—
150 to 600 mm (Metric)

No. 11MEHC and No. 33MEHC Series—
300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)

With Reversible Lock Bolts, Spirit Level (except 4 in.) and Tempered Steel Machine Divided Blade, Regular or Satin Chrome Finish

No. 11HC-12-16R

CAST HEADS
Black Wrinkle Finish

Cat. No.	EDP No.	Size	Blade	Graduation
11HC-4-4R C11HC-4-4R	50050 56361	4"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
11HC-6-4R C11HC-6-4R	50052 56363	6"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
11HC-6-16R C11HC-6-16R	50053 56365	6"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11HC-12-4R C11HC-12-4R	50056 56367	12"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
11HC-12-16R C11HC-12-16R	50058 56369	12"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11HC-18-4R C11HC-18-4R	50060 56371	18"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
11HC-18-16R C11HC-18-16R	50062 56373	18"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11HC-24-4R C11HC-24-4R	50064 56375	24"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
11HC-24-16R C11HC-24-16R	50066 56377	24"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
11MHC-150 C11MHC-150	56242 56381	150 mm	Regular Satin Chrome	mm and ½ mm both sides
11MHC-300 C11MHC-300	56244 56383	300 mm	Regular Satin Chrome	mm and ½ mm both sides
11MHC-600 C11MHC-600	56266 56385	600 mm	Regular Satin Chrome	mm and ½ mm both sides
11MEHC-300 C11MEHC-300	50068 56387	300 mm & 11¾"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
11MEHC-600 C11MEHC-600	50075 56389	600 mm & 23½"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side

(Continued on next page)

Combination Squares With Square Head and Center Head

No. 11HC and No. 33HC Series—*4 to 24 Inch*

No. 11MHC and No. 33MHC Series—*150 to 600 mm (Metric)*

No. 11MEHC and No. 33MEHC Series—*300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)*

continued

FORGED AND HARDENED HEADS

Smooth Black Enamel Finish

Cat. No.	EDP No.	Size	Blade	Graduation
33HC-4-4R C33HC-4-4R	50204 56391	4"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33HC-6-4R C33HC-6-4R	50206 56393	6"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33HC-6-16R C33HC-6-16R	50208 56395	6"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33HC-12-4R C33HC-12-4R	50210 56397	12"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33HC-12-16R C33HC-12-16R	50212 56399	12"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33HC-18-4R C33HC-18-4R	50214 56401	18"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33HC-18-16R C33HC-18-16R	50216 56403	18"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33HC-24-4R C33HC-24-4R	50218 56405	24"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
33HC-24-16R C33HC-24-16R	50220 56407	24"	Regular Satin Chrome	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
33MHC-150 C33MHC-150	56248 56411	150 mm	Regular Satin Chrome	mm and ½ mm both sides
33MHC-300 C33MHC-300	56250 56413	300 mm	Regular Satin Chrome	mm and ½ mm both sides
33MHC-600 C33MHC-600	56252 56415	600 mm	Regular Satin Chrome	mm and ½ mm both sides
33MEHC-300 C33MEHC-300	50222 56417	300 mm & 11¾"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
33MEHC-600 C33MEHC-600	50238 56419	600 mm & 23½"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side

Packed One in a Box

For Separate Parts and Attachments, See Pages 161-164.

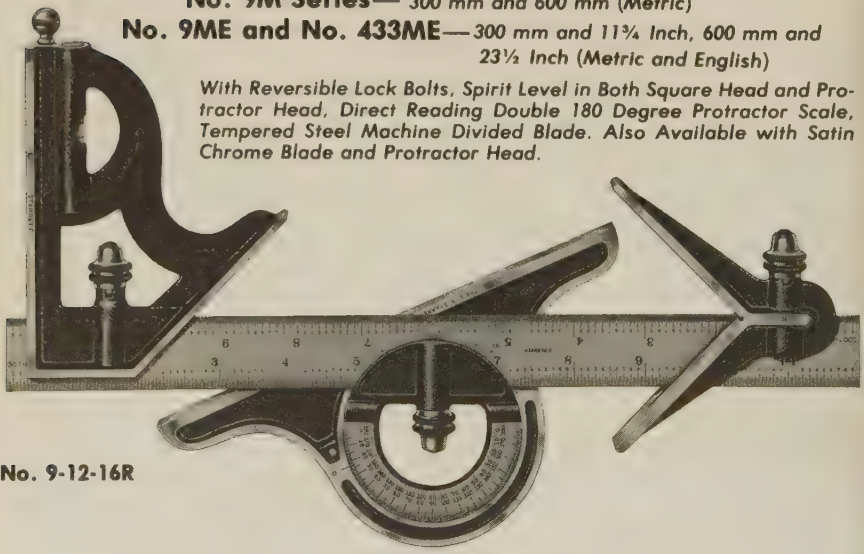
Combination Sets
With Square Head, Center Head and Non-Reversible Protractor Head

No. 9 and No. 433 Series— *12 to 24 Inch*

No. 9M Series— *300 mm and 600 mm (Metric)*

No. 9ME and No. 433ME— *300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)*

With Reversible Lock Bolts, Spirit Level in Both Square Head and Protractor Head, Direct Reading Double 180 Degree Protractor Scale, Tempered Steel Machine Divided Blade. Also Available with Satin Chrome Blade and Protractor Head.



No. 9-12-16R

Cast Heads

Black Wrinkle Finish

Cat. No.	EDP No.	Size	Blade	Graduation
9-12-4R C9-12-4R	50042 50046	12"	Regular Satin Chrome	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
9-12-16R	50043	12"	Regular	**No. 16R**—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
9-18-4R	50044	18"	Regular	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
9-24-4R	50045	24"	Regular	**No. 4R**—8ths, 16ths, Quick Reading 32nds, 64ths
9M-300	56253	300 mm	Regular	mm and ½ mm both sides
9M-600	56254	600 mm	Regular	mm and ½ mm both sides
9ME-300	50047	300 mm & 11¾"	Regular	½ mm and 32nds one side; mm and 64ths reverse side
9ME-600	50048	600 mm & 23½"	Regular	½ mm and 32nds one side; mm and 64ths reverse side

(Continued on next page)

Combination Sets
With Square Head, Center Head
and Non-Reversible Protractor Head
No. 9 and No. 433 Series—*12 to 24 Inch*
No. 9M Series—*300 mm and 600 mm (Metric)*
No. 9ME and No. 433ME—*300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)*

continued

FORGED AND HARDENED SQUARE AND CENTER HEADS

Smooth Black Enamel Finish

Cat. No.	EDP No.	Size	Blade	Graduation
433-12-4R	51536	12"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
433-12-16R	51537	12"	Regular	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
433-18-4R	51538	18"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
433-24-4R	51539	24"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
433ME-300	51540	300 mm & 11¾"	Regular	½ mm and 32nds one side; mm and 64ths reverse side
433ME-600	56125	600 mm & 23½"	Regular	½ mm and 32nds one side; mm and 64ths reverse side

Packed One in a Box

For Separate Parts and Attachments, See Pages 161-164.

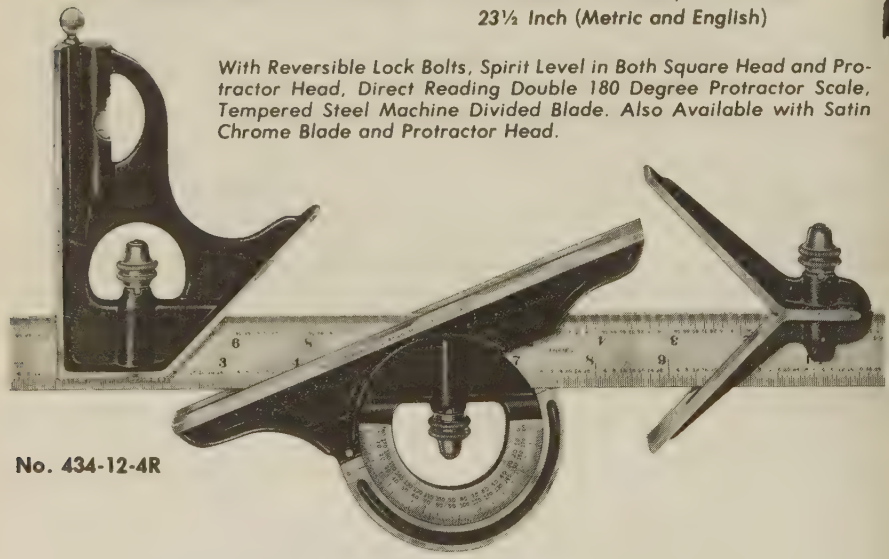
Combination Sets
With Square Head, Center Head and Reversible Protractor Head

No. 435 and No. 434 Series— *12 to 24 Inch*

No. 434M Series— *300 mm and 600 mm (Metric)*

No. 435ME and No. 434ME— *300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)*

With Reversible Lock Bolts, Spirit Level in Both Square Head and Protractor Head, Direct Reading Double 180 Degree Protractor Scale, Tempered Steel Machine Divided Blade. Also Available with Satin Chrome Blade and Protractor Head.



No. 434-12-4R

CAST HEADS
Black Wrinkle Finish

Cat. No.	EDP No.	Size	Blade	Graduation
435-12-4R	51556	12"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
435-12-16R	51557	12"	Regular	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
435-18-4R	51558	18"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
435-24-4R	51559	24"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
435ME-300	51560	300 mm & 11¾"	Regular	½ mm and 32nds one side; mm and 64ths reverse side
435ME-600	51561	600 mm & 23½"	Regular	½ mm and 32nds one side; mm and 64ths reverse side

(Continued on next page)

Combination Sets
With Square Head, Center Head and Reversible Protractor Head
No. 435 and No. 434 Series—*12 to 24 Inch*
No. 434M Series—*300 mm and 600 mm (Metric)*
No. 435ME and No. 434ME—*300 mm and 11¾ Inch, 600 mm and 23½ Inch (Metric and English)*

continued

FORGED AND HARDENED SQUARE AND CENTER HEADS

Smooth Black Enamel Finish

Cat. No.	EDP No.	Size	Blade	Graduation
434-12-4R C434-12-4R	51542 51548	12"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
434-12-16R C434-12-16R	51543 51549	12"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
434-18-4R C434-18-4R	51544 51550	18"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
434-18-16R C434-18-16R	51545 51551	18"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
434-24-4R C434-24-4R	51546 51552	24"	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
434-24-16R C434-24-16R	51547 51553	24"	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
434M-300 C434M-300	56255 56420	300 mm	Regular Satin Chrome	mm and ½ mm both sides
434M-600 C434M-600	56256 56421	600 mm	Regular Satin Chrome	mm and ½ mm both sides
434ME-300 C434ME-300	51554 56422	300 mm & 11¾"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
434ME-600 C434ME-600	51555 56423	600 mm & 23½"	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side

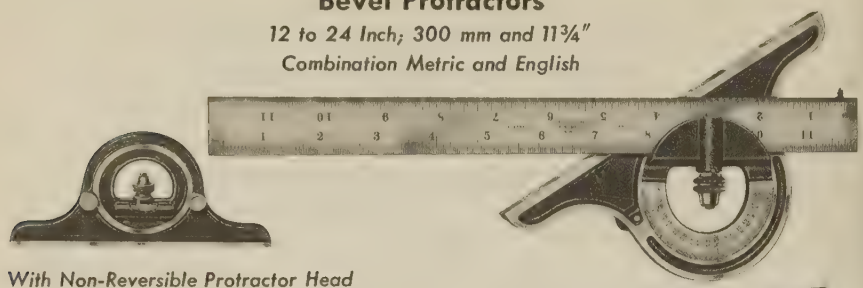
Packed One in a Box

For Separate Parts and Attachments, See Pages 161-164.

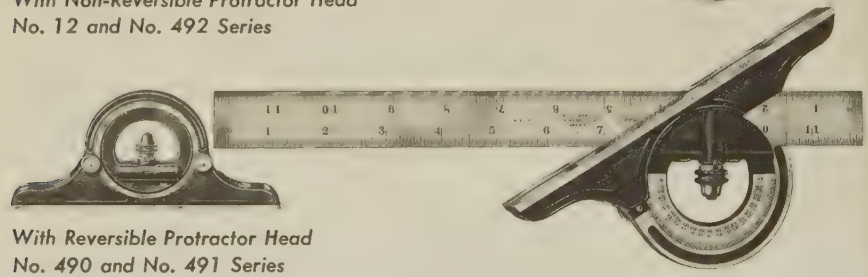
Bevel Protractors

12 to 24 Inch; 300 mm and 11¾"

Combination Metric and English



With Non-Reversible Protractor Head
No. 12 and No. 492 Series



With Reversible Protractor Head
No. 490 and No. 491 Series

★ **Direct Reading Double 180 Degree Protractor Scale**
★ **Reversible Lock Bolt, Spirit Level**
★ **Tempered Steel Machine Divided Blade**

★ **Also Available with SATIN-CHROME Blade and SATIN-CHROME Protractor Head**

NON-REVERSIBLE PROTRACTOR HEAD

Cast Black Wrinkle Finish

Cat. No.	EDP No.	Size	Blade	Graduation
12-12-4R	50103	12"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
12-18-4R	50104	18"	Regular	
12-24-4R	50105	24"	Regular	
12ME-300	50106	300 mm & 11¾"	Regular	½ mm and 32nds one side; mm and 64ths reverse side

NON-REVERSIBLE PROTRACTOR HEAD

Cast Smooth Black Enamel Finish

492-12-4R	52527	12"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
492-18-4R	52528	18"	Regular	
492-24-4R	52529	24"	Regular	
492ME-300	52530	300 mm & 11¾"	Regular	½ mm and 32nds one side; mm and 64ths reverse side

REVERSIBLE PROTRACTOR HEAD

Cast Black Wrinkle Finish

491-12-4R	52521	12"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
491-18-4R	52522	18"	Regular	
491-24-4R	52523	24"	Regular	
491ME-300	52524	300 mm & 11¾"	Regular	½ mm and 32nds one side; mm and 64ths reverse side

REVERSIBLE PROTRACTOR HEAD

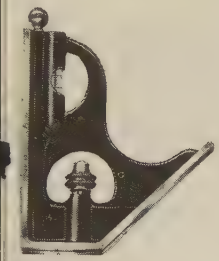
Cast Smooth Black Enamel Finish

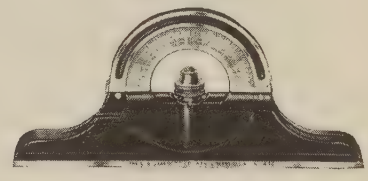
490-12-4R	52511	12"	Regular	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
C490-12-4R	52514	12"	Satin Chrome	
490-18-4R	52512	18"	Regular	
490-24-4R	52513	24"	Regular	

Packed One in a Box

For Separate Parts and Attachments, See Pages 161-164

Square Heads, Center Heads and Protractor Heads Only For Combination Squares, Combination Sets and Bevel Protractors





The Heads listed below fit any blade having the corresponding size on all Combination Squares, Combination Sets and Bevel Protractors except No. 33J and No. 8 Combination Squares. (For No. 33J and No. 8 Heads see listings on page 165.) 12, 18 and 24 inch sizes are interchangeable. In ordering, specify complete catalog number and length of blade.

Square Heads and Center Heads

Size	Cast Black Wrinkle Finish		Forged and Hardened Smooth Black Enamel Finish	
	Cat. No.	EDP No.	Cat. No.	EDP No.
Square Heads				
4″	H11-4	50069	H33-4	50223
6″	H11-6	50070	H33-6	50224
12″	H11-1224	50071	H33-1224	50225
18″	H11-1224	50071	H33-1224	50225
24″	H11-1224	50071	H33-1224	50225
Center Heads				
4″	C11-4	50072	C33-4	50226
6″	C11-6	50073	C33-6	50227
12″	C11-1224	50074	C33-1224	50228
18″	C11-1224	50074	C33-1224	50228
24″	C11-1224	50074	C33-1224	50228

Protractor Heads

Size	Cast Black Wrinkle Finish		Cast Smooth Black Enamel Finish	
	Cat. No.	EDP No.	Cat. No.	EDP No.
Reversible				
12″	PR1224W	52525	PR1224S	52515
	—	—	*CPR1224S	52516
18″	PR1224W	52525	PR1224S	52515
	—	—	*CPR1224S	52516
24″	PR1224W	52525	PR1224S	52515
	—	—	*CPR1224S	52516
Non-Reversible				
12″	PNR1224W	50107	PNR1224S	52531
	*CPNR1224W	50108	—	—
18″	PNR1224W	50107	PNR1224S	52531
	*CPNR1224W	50108	—	—
24″	PNR1224W	50107	PNR1224S	52531
	*CPNR1224W	50108	—	—

* Satin Chrome Finish on Turret

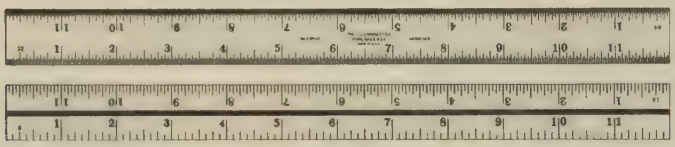
Packed One in a Box

NOTE: For prices of scribers and lock bolts, write for duplicate Parts Booklet No. 115V.

See next page for blades only for combination squares, combination sets and bevel protractors.

Blades Only for Combination Squares, Sets and Bevel Protractors

English, Metric and Combination Metric, English



The Blades listed below fit any head having the corresponding size on all Combination Squares, Combination Sets and Bevel Protractors except No. 33J and No. 8 Combination Squares. (For No. 33J and No. 8 Heads see listings on page 165.) 12, 18, 24 and 36 inch sizes are interchangeable.

Length	Width (approx.)	Thickness (approx.)	Cat. No.	EDP No.	Finish	Graduation
4"	19/32"	1/16"	B4-4R CB4-4R	50076 50077	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
4"	19/32"	1/16"	CB4-16R	50078	Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
6"	3/4"	3/64"	B6-4R CB6-4R	50079 50080	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
6"	3/4"	3/64"	B6-16R CB6-16R	50081 50082	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
12"	1"	3/32"	B12-4R CB12-4R	50083 50084	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
12"	1"	3/32"	CB12-6R	50085	Satin Chrome	No. 6R—Quick Reading 50ths both edges of both sides
12"	1"	3/32"	B12-16R CB12-16R	50086 50087	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
12"	1"	3/32"	BS12-4R	50099	Stainless Steel	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
18"	1"	3/32"	B18-4R CB18-4R	50088 50089	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
18"	1"	3/32"	B18-16R CB18-16R	50090 50091	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
24"	1"	3/32"	B24-4R CB24-4R	50092 50093	Regular Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
24"	1"	3/32"	CB24-6R	50094	Satin Chrome	No. 6R—Quick Reading 50ths both edges of both sides
24"	1"	3/32"	B24-16R CB24-16R	50095 50096	Regular Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
24"	1"	3/32"	BS24-4R	50100	Stainless Steel	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
36"	1"	3/32"	CB36-4R	50097	Satin Chrome	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
36"	1"	3/32"	CB36-16R	50098	Satin Chrome	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths

(Continued on next page)

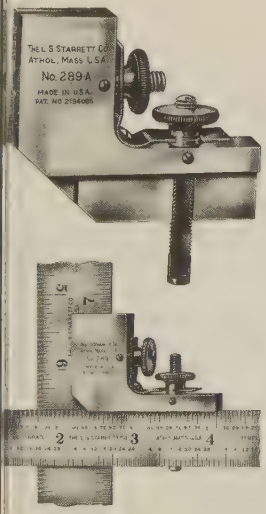
Blades Only for Combination Squares, Sets and Bevel Protractors

English, Metric and Combination Metric, English

continued

Length	Width (approx.)	Thickness (approx.)	Cat. No.	EDP No.	Finish	Graduation
Metric Blades						
150 mm	19 mm	2 mm	**B150-35** **CB150-35**	55985 55988	Regular Satin Chrome	mm and ½ mm both sides
300 mm	25 mm	2.3 mm	**B300-35** **CB300-35**	55986 55989	Regular Satin Chrome	mm and ½ mm both sides
600 mm	25 mm	2.3 mm	**B600-35** **CB600-35**	55987 55990	Regular Satin Chrome	mm and ½ mm both sides
Metric and English Blades						
150 mm & 5¾"	19 mm	2 mm	**B150-36** **CB150-36**	55991 55992	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
300 mm & 11¾"	25 mm	2.3 mm	**B300-36** **CB300-36**	50101 55993	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side
600 mm & 23½"	25 mm	2.3 mm	**B600-36** **CB600-36**	50102 55994	Regular Satin Chrome	½ mm and 32nds one side; mm and 64ths reverse side

All Sizes Packed One in an Envelope



Attachments for Combination Squares

No. 289 Series

This attachment fits the blades of any 12, 18 or 24 inch Combination Square or Set having blades up to 1 inch wide and permits attaching rules, blades or thin steel try-squares, up to 1 inch wide, at right angles to the blade of the square for laying out key seats, centers, scribing horizontal lines, measuring diameters. Made in two sizes as listed below. Both sizes can also be used with No. 289C attachment, next page.

Cat. No.	EDP No.	Range		Seat Length	
		Blade	Rule	Blade	Rule
289A	51322	1"	1"	$1\frac{9}{16}$"	$1\frac{11}{16}$"
289B	51323	1"	1"	$2\frac{3}{8}$"	$2\frac{3}{8}$"

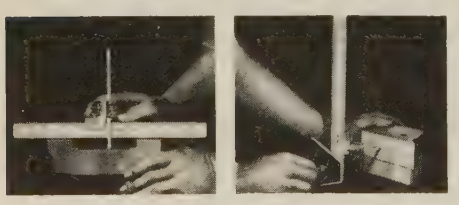
Packed Four in a Box

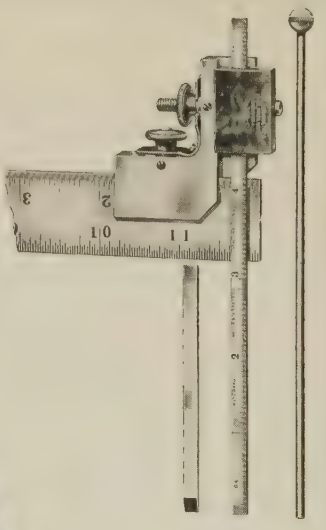
Height Gage and Depth Gage Set for Combination Squares—No. 289C

Used with No. 289A or B, previous page, this set converts any 12", 18" and 24" combination square or set having blades up to 1" wide into a height gage or depth gage. In addition to a clamp block, the set has a scriber, 6" rule (No. 610N-6) and a 6" rod, any one of which may be inserted in the clamp and locked in position. By applying the scriber, a practical height gage results. Use of the rule converts the tool to a depth gage for measuring in 64ths of an inch. With the rod used as a depth gage, small recesses and holes can also be checked.

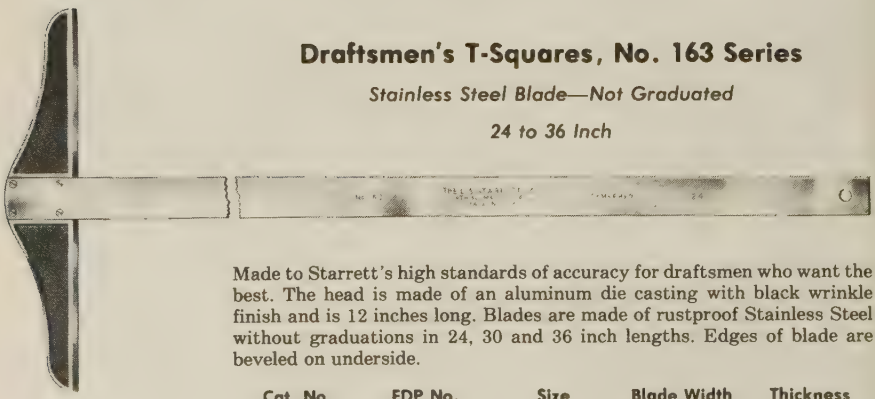
Cat. No.	EDP No.	Description
289C	51324	Clamp Block with Scriber, Rule and Rod

Packed One in a Box





Used as depth gage (far left) and as scriber



Draftsmen's T-Squares, No. 163 Series

Stainless Steel Blade—Not Graduated

24 to 36 Inch

Made to Starrett's high standards of accuracy for draftsmen who want the best. The head is made of an aluminum die casting with black wrinkle finish and is 12 inches long. Blades are made of rustproof Stainless Steel without graduations in 24, 30 and 36 inch lengths. Edges of blade are beveled on underside.

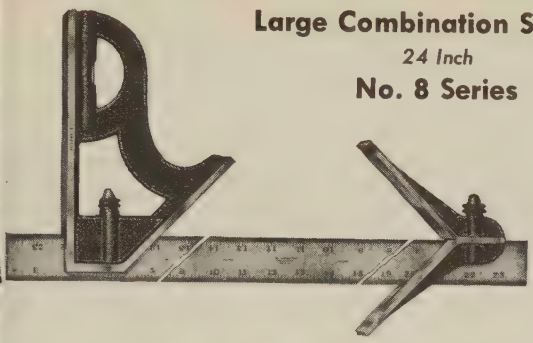
Cat. No.	EDP No.	Size	Blade Width	Thickness
163-24	50605	24"	1¼"	3/64"
163-30	50606	30"	1¼"	3/64"
163-36	50607	36"	1¼"	3/64"

Packed One in a Package

Large Combination Squares

24 Inch

No. 8 Series



★ **Extra Large, Heavy Duty Construction Throughout**
★ **Reversible Lock Bolts**
★ **Accurate, Spirit Level**
★ **Tempered Steel Blade with Distinctive Machine Divided Graduations**

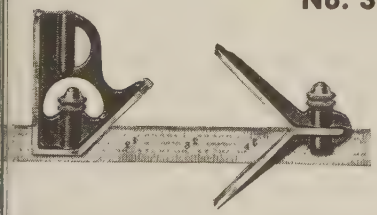
Rugged construction throughout. The Square Head is 8 3/8 inches long and the Center Head has 4 1/2 inch arms. Furnished with 24 inch blade 1 1/2 inches wide by 1/10 inch thick with distinctive machine divided graduations. Heads have wrinkled finish.

Cat. No.	EDP No.	Blade Length	Graduation
With Square Head Only			
8H	50037	24"	No. 4—8ths, 16ths, 32nds, 64ths
With Square Head and Center Head			
8HC	50038	24"	No. 4—8ths, 16ths, 32nds, 64ths
Separate Parts			
H8	50039	—	Square Head Only
C8	50040	—	Center Head Only
B824-4	50041	24"	Blade Only, No. 4 Graduation

Packed One in a Box

Junior Combination Squares

No. 33J Series—*6 Inch*



WIDELY used by mechanics, toolmakers and pattern-makers because of the compact, small size and light weight featured in these Combination Squares. Both Blade and Heads are smaller than on regular squares. Heads are drop forged, hardened and have smooth black enameled finish. Blades are approximately 19/32 inch wide and available with either No. 4R or No. 16R Graduations.

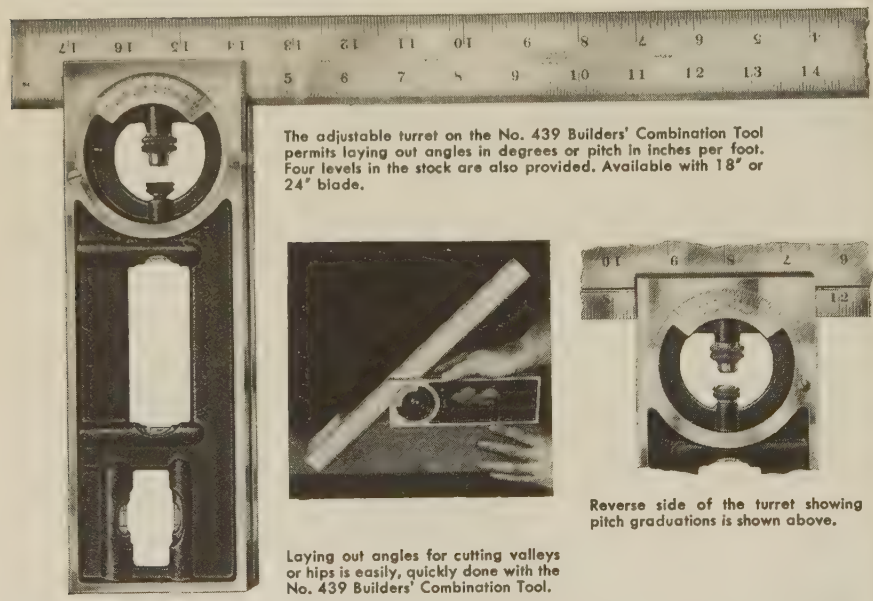
Cat. No.	EDP No.	Blade Length	Graduation
With Square Head Only			
33JH-6-4R	50229	6"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
33JH-6-16R	50231	6"	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths 100ths
With Square Head and Center Head			
33JHC-6-4R	50230	6"	No. 4R—8ths, 16ths, Quick Reading 32nds, 64ths
33JHC-6-16R	50232	6"	No. 16R—Quick Reading 32nds, 64ths, Aircraft Quick Reading 50ths, 100ths
Separate Parts			
H33J	50223	—	Square Head Only
C33J	50226	—	Center Head Only
B33J-4R	50235	6"	Blade Only, No. 4R Graduation
B33J-16R	50236	6"	Blade Only, No. 16R Graduation

Packed One in a Box

Builders' Combination Tool

18 and 24 Inch

No. 439



The adjustable turret on the No. 439 Builders' Combination Tool permits laying out angles in degrees or pitch in inches per foot. Four levels in the stock are also provided. Available with 18″ or 24″ blade.

Laying out angles for cutting valleys or hips is easily, quickly done with the No. 439 Builders' Combination Tool.

Reverse side of the turret showing pitch graduations is shown above.

THE STARRETT No. 439 Builders' Combination Tool combines seven extremely useful tools in a single tool—a rule, square, level, protractor, bevel, pitch-to-foot indicator and plumb. One of the most versatile tools made, and especially desirable for carpenters, builders, patternmakers, cabinet makers and all mechanics. Especially convenient for laying out all kinds of complicated work which otherwise would require lengthy calculations.

This tool is available with an 18 or 24 inch adjustable, tempered steel blade 1½ inches wide mounted in the revolving turret of a stock 9 inches long. One side of the turret has a double graduation from 0 to 90 degrees in opposite directions; the reverse side is graduated in ½ inch pitch from 0 to 12 inches per foot pitch. The stock also has four levels which permit leveling or plumbing the work in relation to any angle or pitch. The blade has highly accurate machine divided graduations in 8ths, 16ths, 32nds and 64ths. Blade can also be compactly folded against the stock, permitting convenient storage in a tool chest.

Cat. No.	EDP No.	Blade Length	Blade Graduation	Head Graduation Degrees	Head Graduation Pitch
439-18	52110	18″	No. 4—8ths, 16ths, 32nds, 64ths	0 to 90°	0 to 12″ per ft.
439-24	52111	24″	No. 4—8ths, 16ths, 32nds, 64ths	0 to 90°	0 to 12″ per ft.

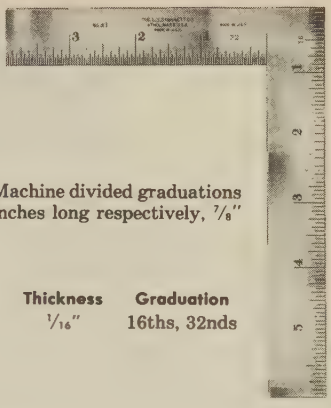
Packed One in a Box

Thin Steel Try Square

For Machinists and Draftsmen

6 Inch

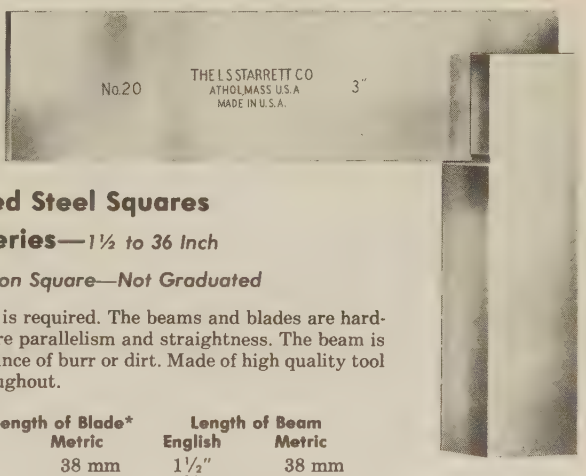
No. 21



Both inner and outer edges are accurate for squareness. Machine divided graduations on both sides in 16ths and 32nds. Blades are 6 and 4 inches long respectively, 7/8" wide and 1/16" thick.

Cat. No.	EDP No.	Size	Blade Length	Width	Thickness	Graduation
21	50149	6"	6" and 4"	7/8"	1/16"	16ths, 32nds

Packed One in a Box



Hardened Steel Squares

No. 20 Series—*1½ to 36 Inch*

A Master Precision Square—Not Graduated

For use where extreme accuracy is required. The beams and blades are hardened, ground and lapped to insure parallelism and straightness. The beam is grooved at inner corner for clearance of burr or dirt. Made of high quality tool steel. Finest craftsmanship throughout.

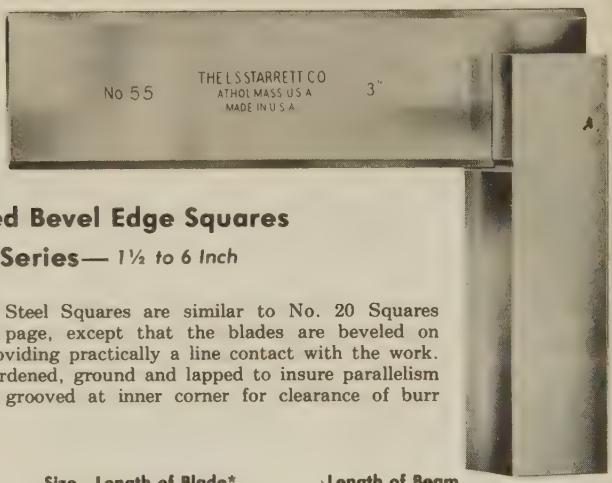
		Size—Length of Blade*		Length of Beam	
Cat. No.	EDP No.	English	Metric	English	Metric
20-1½	50128	1½"	38 mm	1½"	38 mm
20-3	50130	3"	76 mm	2⅜"	60 mm
20-4½	50132	4½"	114 mm	3½"	89 mm
20-6	50134	6"	152 mm	4⅜"	110 mm
20-12	50136	12"	305 mm	7"	178 mm
20-18	50138	18"	457 mm	10½"	267 mm
20-24	50140	24"	610 mm	12⅝"	313 mm
20-36**	50142	36"	914 mm	20"	508 mm

*Length of Blade from the inner edge of the Beam to the end of Blade.

**36 inch and larger size squares have special screws used to secure the blade to the beam.

NOTE: Squares in larger sizes can be furnished; prices quoted on application.

Cases Available for Squares Through 12"; Rack Type Cases for Squares 18" up
Sent Without Case Unless Otherwise Ordered
Packed One in a Box



Hardened Bevel Edge Squares

No. 55 Series— *1½ to 6 Inch*

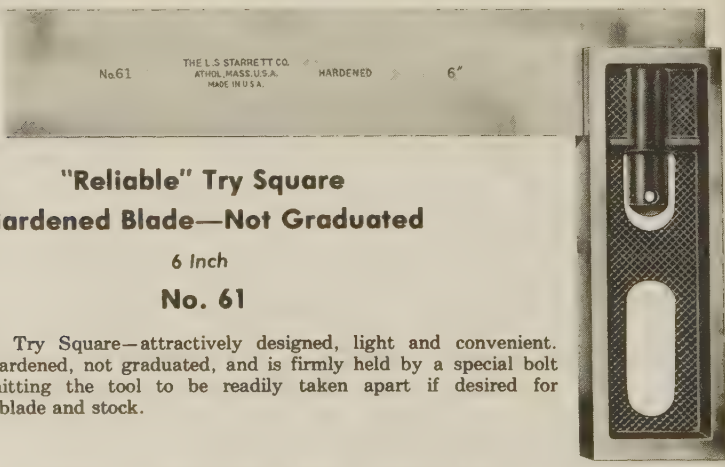
Starrett No. 55 Hardened Steel Squares are similar to No. 20 Squares described on the previous page, except that the blades are beveled on both edges of each side, providing practically a line contact with the work. The beam and blade are hardened, ground and lapped to insure parallelism and straightness. Beam is grooved at inner corner for clearance of burr and dirt.

Cat. No.	EDP No.	Size—Length of Blade* English	Size—Length of Blade* Metric	Length of Beam English	Length of Beam Metric
55-1½	50277	1½"	38 mm	1½"	38 mm
55-3	50279	3"	76 mm	2⅜"	60 mm
55-4½	50281	4½"	114 mm	3½"	89 mm
55-6	50283	6"	152 mm	4⁵⁄₁₆"	110 mm

*Length of Blade from the inner edge of the Beam to the end of the Blade

Cases Available (similar to No. 20 Case); Sent Without Case Unless Otherwise Ordered

Packed One in a Box



"Reliable" Try Square

Hardened Blade—Not Graduated

6 Inch

No. 61

A very useful Try Square—attractively designed, light and convenient. The blade is hardened, not graduated, and is firmly held by a special bolt and nut permitting the tool to be readily taken apart if desired for regrinding the blade and stock.

Cat. No.	EDP No.	Size—Length of Blade	Length of Beam
61	50303	6"	3⅝"

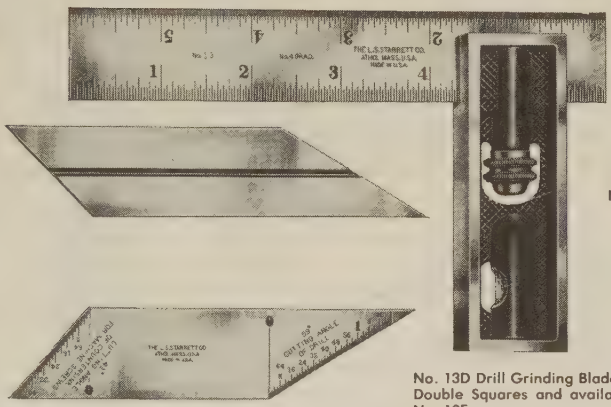
Packed One in a Box

Double Squares

With Hardened Blades

No. 13 Series—*4 to 6 Inch*

No. 13M Series—*100 to 150 mm*



No. 13E Double Square With Graduated and Bevel Blades Illustrated Left

No. 13D Drill Grinding Blade shown left. Fits 6 inch Double Squares and available separately or with No. 13F.

THE Starrett No. 13 Square is very popular with machinists, toolmakers, and pattern makers. The sliding blades are adjustable making it more practical for a wide variety of uses than a common square with fixed blade. The faces of the head are ground square, and the 6-inch size has a level.

The bevel blade has an octagon angle at one end and hexagon angle at the other end clearly marked.

A drill grinding blade, also available to fit the 6-inch square, is beveled to 59° for drill grinding on one end and 41°, the cutting angle of countersinks for machine screws, at the other. Both ends have quick reading graduations in 64ths, and the graduation is located to measure perpendicularly to the axis of the drill. By reading the graduations, the center point can be easily and accurately located.

The 6-inch square head with which the drill grinding blade is used is approximately 3½ inches long, and the faces approximately 9/16 inch wide.

Cat. No.	EDP No.	Size	Description
			ENGLISH—No. 4 Graduation—8ths, 16ths, 32nds, 64ths
13A	50109	4"	With Graduated Blade Only
13B	50110	4"	With Graduated and Bevel Blades
13C	50111	6"	With Graduated Blade Only
13E	50112	6"	With Graduated and Bevel Blades
13F	50113	6"	Complete, with Graduated, Bevel and Drill Grinding Blades
13D	50114	—	Drill Grinding Blade Only (for 6" squares)
			METRIC—mm both edges one side; mm and ½ mm reverse side
13MA	56278	100 mm	With Graduated Blade Only
13MB	56279	100 mm	With Graduated and Bevel Blades
13MC	56280	150 mm	With Graduated Blade Only
13ME	56263	150 mm	With Graduated and Bevel Blades

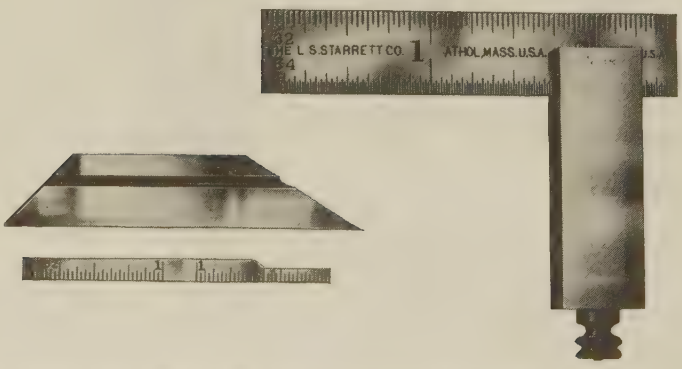
Sent With Graduated and Bevel Blades Unless Otherwise Ordered
Packed One in a Box

Double Steel Squares

With Hardened and Ground Head and Blades

No. 14 Series—2½ Inch

No. 14M Series—50mm(Metric)



No. 14D Double Square complete, with Graduated, Bevel and Narrow Blades, is illustrated above.

A fine precision Double Steel Square designed for tool and diemakers. Blades are adjustable so it can be used in places impossible to use a square with stationary blades. A knurled clamping nut with tension spring accurately locks the blades in any desired position. Both head and blade are hardened and precision ground.

The graduated blade is 2½ inches long and graduated on one side, upper edge in 32nds and lower edge in 64ths.

The bevel blade for checking angles is beveled 45° on one end and 30° on other.

The Narrow Graduated Blade is 2¼ inches long (58 mm metric) with 32nds graduation on one side, and 64ths on the other. Metric blades are mm on one side and ½ mm on the other. It is $^{5}/_{32}$ inch wide over a length of approximately 1⅝ inches, and then cut away at one end to a width of $^{3}/_{32}$ inch.

Cat. No.	EDP No.	Size	Graduation	Description
14A	50117	2½"	32nds, 64ths	With Graduated Blade only
14D	50118	2½"	32nds, 64ths	Complete with Graduated, Graduated Narrow Blade, and Bevel Blade
				METRIC
14MA	56260	50 mm	mm, ½ mm	With Graduated Blade only
14MD	56261	50 mm	mm, ½ mm	Complete with Graduated, Graduated Narrow Blade, and Bevel Blade

No. 14D Complete Sent Unless Otherwise Ordered

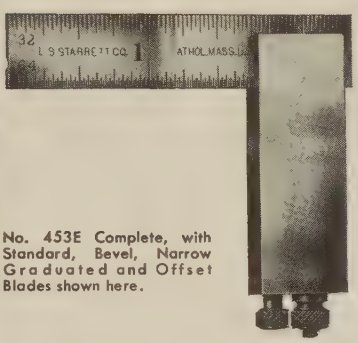
Packed One in a Box

Die Makers' Squares

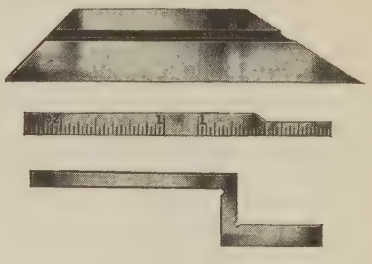
With Hardened and Ground Head and Blades

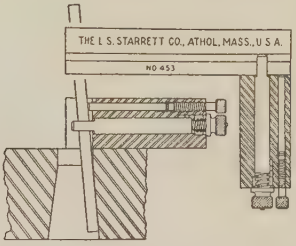
Angular and Sliding Blade Adjustment

No. 453 Series—*2½ Inch and 50 mm (Metric)*



No. 453E Complete, with Standard, Bevel, Narrow Graduated and Offset Blades shown here.





The sliding blades of this tool and die makers' square can be adjusted at an angle with the beam for measuring the clearance in dies (see sectional view). The larger knurled thumb screw locks the blades at any position, and the smaller one tilts the blades at an angle. To set the blades at an angle, first release the blade clamp screw, then the blade may be tilted to the desired angle by turning the small knurled screw into the beam. The blade can be held in position by tightening the clamping screw. Head and blades are hardened and ground.

The Standard Graduated Blade is 2½ inches long (50 mm metric) and ½ inch wide. Graduated on one side, upper edge in 32nds, lower edge in 64ths.

The Bevel Blade is approximately 2½ inches long and ½ inch wide. Beveled to 30° on one end, 45° on the other.

The Narrow Graduated Blade is 2¼ inches long (58 mm metric) with 32nds graduation on one side, and 64ths on the other. It is $^{5}/_{32}$ inch wide over a length of approximately $1^{5}/_{8}$ inches, and then cut away at one end to a width of $^{3}/_{32}$ inch.

The Offset Blade is used where it would be impossible to sight a straight blade. It protrudes from the square about 1½ inches and is $^{1}/_{8}$ inch wide. Both sides of each edge are beveled to give a line contact.

Cat. No.	EDP No.	Size	Graduation	Description
453A	52345	2½"	32nds, 64ths	With Standard Graduated Blade
453C	52347	2½"	32nds, 64ths	With Standard and Narrow Graduated Blades
453E	52349	2½"	32nds, 64ths	Complete with Standard, Bevel, Narrow and Offset Blades
453EZ	52351	2½"	32nds, 64ths	Complete with Standard, Bevel, Narrow and Offset Blades in Case
453MA	52346	50 mm	mm and ½ mm	With Standard Graduated Blade
453MC	52348	50 mm	mm and ½ mm	With Standard and Narrow Graduated Blades
453ME	52350	50 mm	mm and ½ mm	Complete with Standard, Bevel, Narrow and Offset Blades
453MEZ	52352	50 mm	mm and ½ mm	Complete with Standard, Bevel, Narrow and Offset Blades in Case

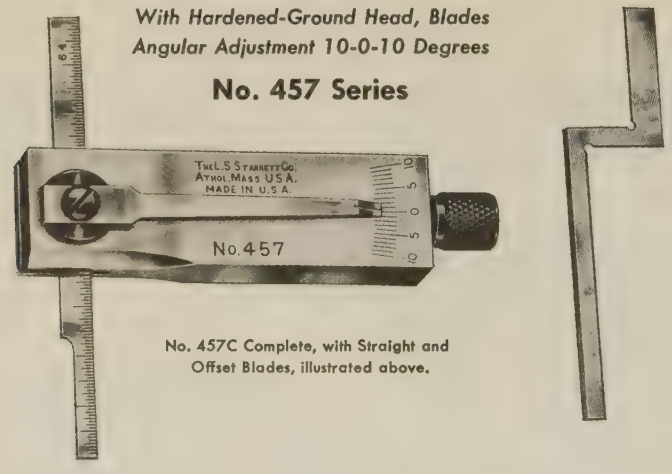
Attractive, protective Case Also Available; No. 453E Complete without case Sent Unless Otherwise Ordered

Packed One in a Box

Improved Die Makers' Squares

With Hardened-Ground Head, Blades
Angular Adjustment 10-0-10 Degrees

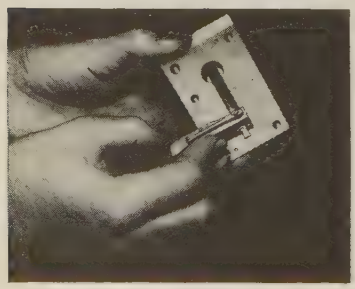
No. 457 Series



No. 457C Complete, with Straight and Offset Blades, illustrated above.

THE Starrett No. 457 Improved Die Makers' Square is a highly useful tool for tool and diemakers, especially for measuring die clearances. Also very handy for patternmakers to check angles and drafts on patterns.

Beam of this square is graduated to show the setting in degrees of the blades. Blades can be set for any angle up to 10° either side of 0 and the angle is indicated by the line on the pointer.



No. 457 Die Makers' Square is used to determine amount of clearance in this die. Movable pointer registers clearance in degrees.

The Narrow Graduated Blade is 2¼ inches long with 32nds on one side and 64ths on the other. It is $\frac{5}{32}$ inch wide over a length of approximately 1⅝ inches and then cut away at one end to a width of $\frac{3}{32}$ inch.

The Offset Blade, which is used where it would be impossible to insert the straight blade, protrudes from the square about 1½ inches. It is ⅛ inch wide and both sides of each edge are beveled to give a line contact.

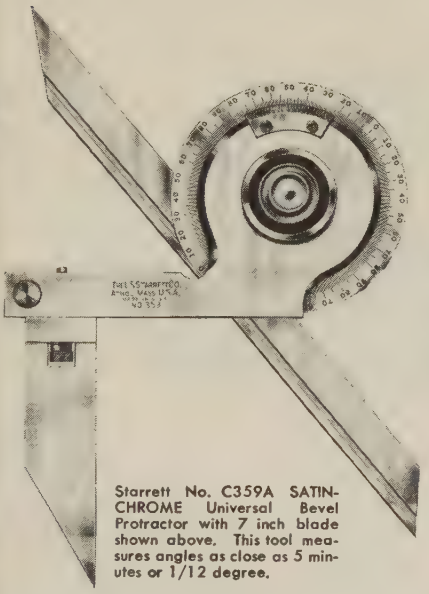
The beam of this square is approximately 2$\frac{1}{16}$ inches long, $\frac{5}{8}$ inch wide and $\frac{11}{32}$ inch thick. Beam is beveled adjacent to the blade so that the blade is readily visible when checking in holes, slots, etc. Blades and beams are hardened and ground.

Cat. No.	EDP No.	Angular Range	Description
457A	52428	10°-0-10°	With Straight Blade only
457C	52429	10°-0-10°	Complete, with Straight and Offset Blades

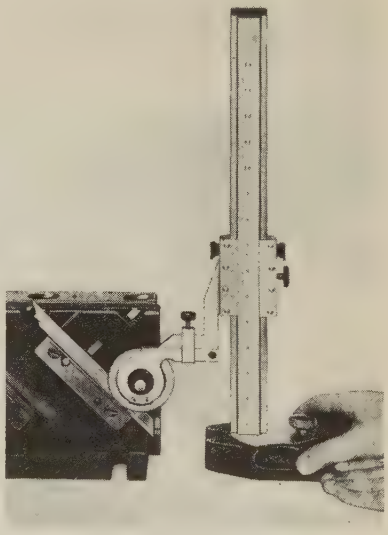
No. 457C Complete Sent Unless Otherwise Ordered

Packed One in a Box

Starrett
Precision Universal Bevel Protractors



Starrett No. C359A SATIN-CHROME Universal Bevel Protractor with 7 inch blade shown above. This tool measures angles as close as 5 minutes or 1/12 degree.



No. C359A Universal Bevel Protractor used with No. 254 Master Vernier Height Gage checking angle on fixture.

- ★ **Available with Starrett SATIN-CHROME Finish (except blades and acute angle attachment)—Faster, No Glare Reading—Highly Resistant to Stains and Corrosion**
- ★ **Highly Accurate, Distinctive, Machine Divided Graduations**
- ★ **Vernier Models Available Reading to 5 minutes or 1/12 Degree**
- ★ **Available with Ultra-Sensitive Adjustment**
- ★ **7 inch or 12 inch Adjustable Blades**
- ★ **Independent Adjustment and Clamping for Dial and Blade**
- ★ **Acute Angle Attachment Available**

DESIGNED for precision measuring and laying out of angles, the Starrett Universal Bevel Protractor is one of the most valuable and useful tools in the kit of every good mechanic, toolmaker, inspector, machinist and draftsman.

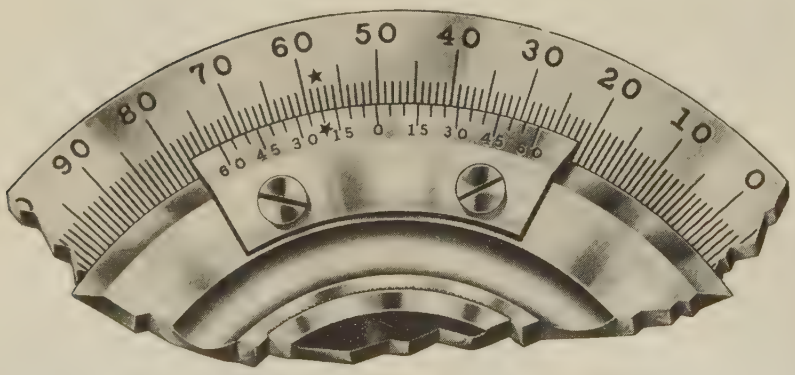
Made of the finest steel and workmanship throughout, Starrett Universal Bevel Protractors consist of a body with a fixed blade and an adjustable dial graduated in degrees. The protractor dial is slotted to hold a 7 inch or 12 inch blade which can be rotated with the dial to the angle desired and also adjusted to the required length.

The dial bearing is hardened and ground and of large diameter to insure close accuracy. Both the dial and blade have independent adjustment and are locked independently by knurled thumb nuts. One side of the tool is flat which permits laying it flat on the work or paper. Flush surfaces on base also permit using protractor on Vernier height gages.

Available in various types, with Vernier, ultra sensitive adjustment and acute angle attachment.

How To Read A Vernier

On Universal Bevel Protractors



STARRETT Universal Bevel Protractors with Vernier can be accurately read to 5 minutes (5′) or 1/12 of a degree. The dial of the protractor is graduated both to the right and left of zero up to 90 degrees. The Vernier scale is also graduated to the right and left of zero up to 60 minutes (60′), each of the 12 Vernier graduations representing 5 minutes. Since both the protractor dial and Vernier scale have graduations in opposite directions from zero, any size angle can be measured, and it should be remembered that the Vernier reading must be read in the same direction from zero as the protractor, either left or right.

Since 12 graduations on the Vernier scale occupy the same space as 23 graduations or 23 degrees on the protractor dial, each Vernier graduation is 1/12 degree or 5 minutes shorter than 2 graduations on the protractor dial. Therefore, if the zero graduation on the Vernier scale coincides with a graduation on the protractor dial, the reading is in exact degrees, but if some other graduation on the Vernier scale coincides with a protractor graduation, the number of Vernier graduations multiplied by 5 minutes must be added to the number of degrees read between the zeros on the protractor dial and Vernier scale.

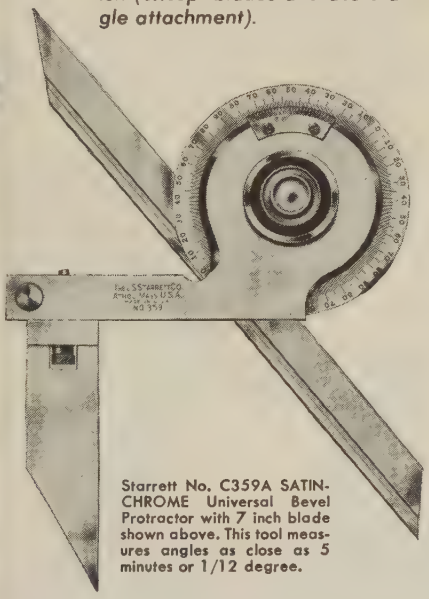
Example: In the illustration above the zero on the Vernier scale lies between the "50" and "51" on the protractor dial to the left of the zero, indicating 50 whole degrees. Also reading to the left, the 4th line on the Vernier scale coincides with the "58" graduation on the protractor dial as indicated by the stars and therefore 4 x 5 minutes or 20 minutes are to be added to the number of degrees. The reading of the protractor, therefore, is 50 degrees and 20 minutes (50° 20′).

Universal Bevel Protractors

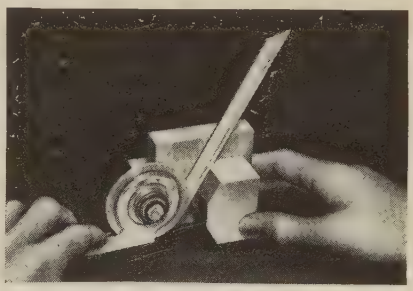
With Vernier, Ultra-Fine Adjustment and Acute Angle Attachment

No. C359 Series—*7 or 12 Inch Blades—Graduations in Degrees through 360°*

With No-Glare Satin Chrome Finish (except blades and acute angle attachment).



Starrett No. C359A SATIN-CHROME Universal Bevel Protractor with 7 inch blade shown above. This tool measures angles as close as 5 minutes or 1/12 degree.



Measuring a 150° obtuse angle.

ANY angle up to 360° can be laid out or measured to an accuracy of 5 minutes or 1/12 of a degree with this fine precision tool.

The dial of the Starrett No. 359 Universal Bevel Protractor has highly accurate, machine divided graduations and is rotated on a hardened and ground, large diameter bearing. Graduations read in degrees around a complete circle from 0°–90°, 90°–0°, 0°–90°, 90°–0°. A Vernier permits reading angles or setting the tool to close limits within 5 minutes or 1/12 degree.

Extremely fine adjustment can be obtained on this protractor by an Ultra-Sensitive Adjustment feature conveniently located on the front of the protractor where it is easy to use. This feature consists of a large diameter thumb nut at the middle which engages the fine adjustment device by a slight downward pressure. The lower knurled thumb nut locks the protractor dial at the desired angular setting.

The protractor dial is slotted to hold a 7 inch or 12 inch blade which can be rotated with the dial to the angle required and also independently adjusted to any desired length. The knurled upper thumb nut locks the blade at any point in its length.

An Acute Angle Attachment for quick accurate measuring or laying out of small angles is also furnished with the tool and extra blades are available. One side of the tool is flat which permits laying it flat on the work or paper. Flush surfaces on base also permit using protractor on Vernier height gages, including No. 254 in all sizes and No. 454—18″ and larger.

Without Case		In Case		Blade Size	Range	Graduation
Cat. No	EDP No.	Cat. No.	EDP No.			
C359A	51393	C359BZ	51394	7″	0 to 90° thru 360°	5 min. or 1/12 degree
C359C	51395	C359DZ	51396	12″		
C359E	51397	C359FZ	51398	7″ & 12″		

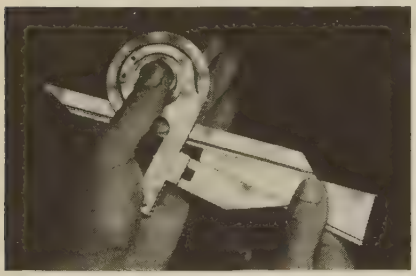
Part No. 4780 (EDP No. 70538), 7″ Blade Only
Part No. 4781 (EDP No. 70539), 12″ Blade Only
Cat. No. 359G (EDP No. 51392), Acute Angle Attachment Only

Packed One in a Box

Universal Bevel Protractors

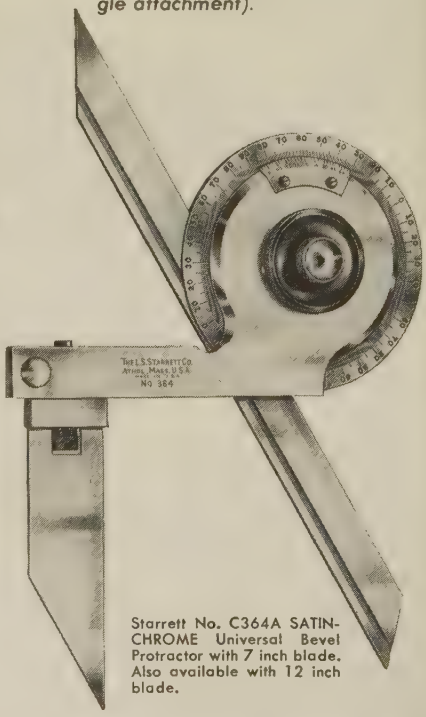
With Vernier and Acute Angle Attachment

No. C364 Series—*7 or 12 Inch Blades—Graduations in Degrees thru 360°*



Measuring a 10° acute angle using acute angle attachment.

With No-Glare Satin Chrome Finish (except blades and acute angle attachment).



Starrett No. C364A SATIN-CHROME Universal Bevel Protractor with 7 inch blade. Also available with 12 inch blade.

THE No. 364 Universal Bevel Protractor is another Starrett precision tool for highly accurate measuring and laying out of angles. Similar to the No. 359 described on the previous page with Vernier and Acute Angle Attachment but without fine adjustment. Protractor dial is graduated over 360 degrees from 0°–90°, 90°–0°, 0°–90°, 90°–0°.

Highly accurate and easy to read, the protractor dial has distinct, machine divided graduations and rotates on a large diameter, hardened and ground bearing. With the Vernier, the tool can be set or angles read to within 5 minutes or 1/12 degree. The lower thumb nut, large in diameter and knurled for easy use, firmly locks the protractor dial at any desired angular setting.

The protractor dial is slotted to hold a 7 inch or 12 inch blade which can be rotated with the dial to the angle required and also independently adjusted to any desired length. The knurled upper thumb nut locks the blade at any point in its length.

An Acute Angle Attachment for quick accurate measuring or laying out of small angles is also furnished with the tool and extra blades are available. One side of the tool is flat which permits laying it flat on the work or paper. Flush surfaces on base also permit using protractor on Vernier height gages, including No. 254 in all sizes and No. 454—18″ and larger.

Without Case		In Case		Blade Size	Range	Graduation
Cat. No	EDP No.	Cat. No.	EDP No.			
C364A	51415	**C364BZ**	51416	7″	0 to 90° thru 360°	5 min. or 1/12 degree
C364C	51417	**C364DZ**	51418	12″		
C364E	51419	**C364FZ**	51420	7″ & 12″		

Part No. 4780 (EDP No. 70538), 7″ Blade Only
Part No. 4781 (EDP No. 70539), 12″ Blade Only
Cat. No. 364G (EDP No. 51392), Acute Angle Attachment Only

Packed One in a Box

Steel Protractor

0 to 180 Degrees

No. 19

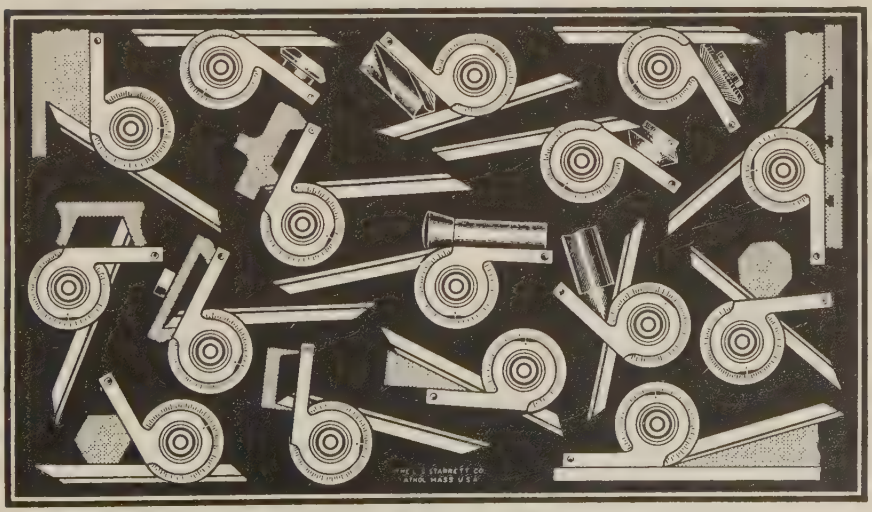
MACHINISTS, draftsmen and all mechanics will find the Starrett No. 19 Steel Protractor a highly useful, accurate tool for setting bevels, transferring angles, as a small T-square, for checking within certain limits the clearance on cutters, and many other applications.

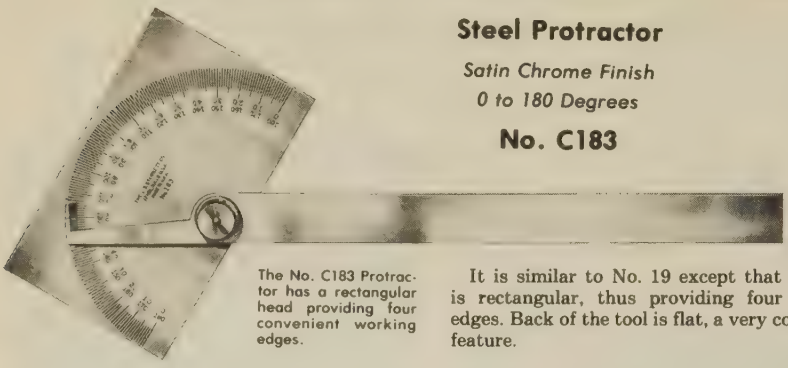
This Protractor has a semi-circular head with double graduations from 0 to 180 degrees in opposite directions. The blade is six inches long and has a graduation line at one end for accurate setting and reading of angles. By means of a lock joint the blade can be set firmly at the desired angle by a knurled nut. The back of the tool is flat.

Cat. No.	EDP No.	Blade Length	Range
19	50127	6"	0 to 180°

Packed One in a Box

Starrett Universal Bevel Protractors are invaluable tools for precision measuring and laying out of angles.





Steel Protractor

Satin Chrome Finish

0 to 180 Degrees

No. C183

The No. C183 Protractor has a rectangular head providing four convenient working edges.

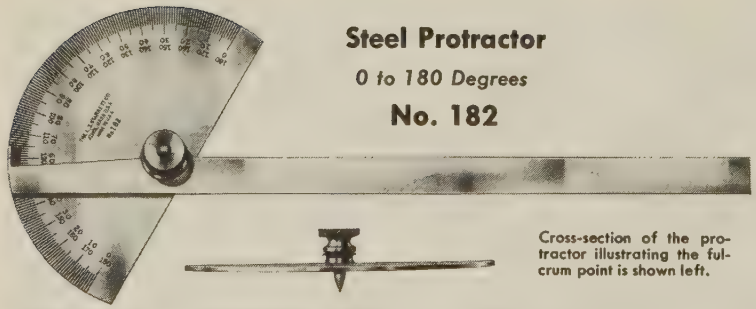
The Starrett No. C183 Steel Protractor is another useful tool for setting bevels, transferring angles, etc., which will prove invaluable to draftsmen, machinists and all mechanics.

It is similar to No. 19 except that the head is rectangular, thus providing four working edges. Back of the tool is flat, a very convenient feature.

Like No. 19, the No. C183 Protractor has double graduations from 0 to 180 degrees in opposite directions thus permitting reading an angle directly and also the supplementary angle. The blade can be locked firmly at any angle by a lock joint and knurled nut.

Cat. No.	EDP No.	Blade Length	Range
C183 Satin Chrome	50672	6"	0 to 180°

Packed One in a Box



Steel Protractor

0 to 180 Degrees

No. 182

Cross-section of the protractor illustrating the fulcrum point is shown left.

THIS Protractor is designed for draftsmen, civil engineers, and is particularly valuable for drawing any number of radial lines at any desired angle from a common center. To use the Protractor, the fulcrum point is first pressed into the drawing at the required center and then the protractor hub is placed over the fulcrum point. Then by positioning the blade at the desired angles any number of lines can be drawn through the common center.

The Protractor has a 6 inch blade and lies flat on the paper. Graduated from 0 to 180 degrees in opposite directions. Furnished with one needle and one cone point.

Cat. No.	EDP No.	Blade Length	Range
182	50670	6"	0 to 180°

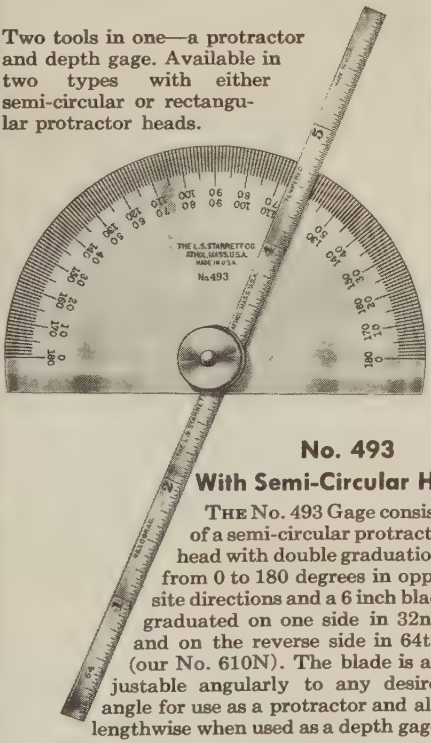
Packed One in a Box

Protractor and Depth Gages

6 Inch—180 Degrees

No. 493 Series

Two tools in one—a protractor and depth gage. Available in two types with either semi-circular or rectangular protractor heads.



No. 493
With Semi-Circular Head

THE No. 493 Gage consists of a semi-circular protractor head with double graduations from 0 to 180 degrees in opposite directions and a 6 inch blade graduated on one side in 32nds and on the reverse side in 64ths (our No. 610N). The blade is adjustable angularly to any desired angle for use as a protractor and also lengthwise when used as a depth gage.

No. C493B
With Rectangular Head

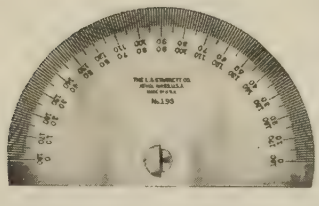
Satin Chrome Finish

The No. C493B Protractor and Depth Gage is similar to the No. 493 described at the left but has a rectangular protractor head providing four convenient working edges. Both models have a flat surface on the back of the head permitting laying the tool flat upon the paper or work and a knurled thumb nut which locks the blade in any position.

Cat. No. Semi-Circular Head	EDP No.	Cat. No. Rectangular Head	EDP No.	Blade Length	Blade Graduations	Protractor Graduations
493	52532	C493B Satin Chrome	52534	6"	32nds, 64ths	0 to 180°

Packed One in a Box

No. 193 Steel Protractor—*0 to 180 Degrees*



THIS Protractor can be used with No. 47 and No. 49 Universal Bevels by setting them against the revolving stud which quickly converts them into Bevel Protractors at slight cost. Protractor has double graduations from 0 to 180 degrees in opposite directions.

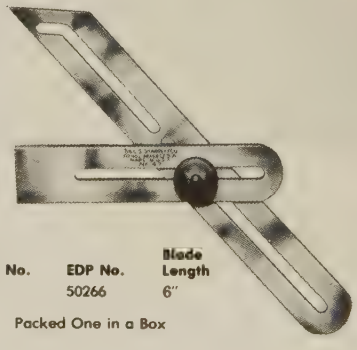
Cat. No.	EDP No.	Range
193	50696	0 to 180°

Packed Two in a Box

Universal Bevel
No. 47—*6 Inch*

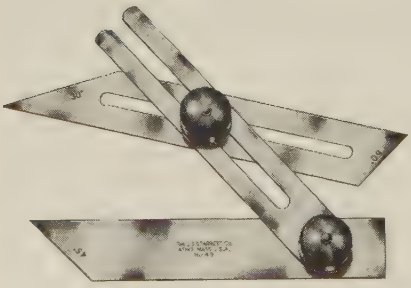
THIS improved Universal Bevel has both offset and straight slots in the blade in combination with straight slots in the stock that make possible a wide flexibility of adjustment and angle settings impossible to obtain with many ordinary bevels.

Length of blade is 6 inches; stock 3½ inches. The stock lies flat on the work or paper since head of the clamping bolt is recessed. By using this tool with the No. 193 Protractor, it may be easily converted into a Bevel Protractor.



Cat. No.	EDP No.	Blade Length
47	50266	6"

Packed One in a Box



Cat. No.	EDP No.	Blade Length
49	50267	4" (approx.)

Packed One in a Box

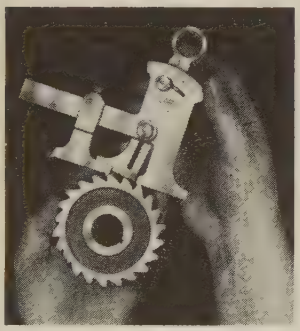
Combination Bevel
No. 49—*4 Inch*

ANY angle may be easily transferred from one surface to another with the No. 49 Combination Bevel. This tool has a slotted blade which swings on a stud on the stock to any angle desired and is locked in position by a knurled thumb nut.

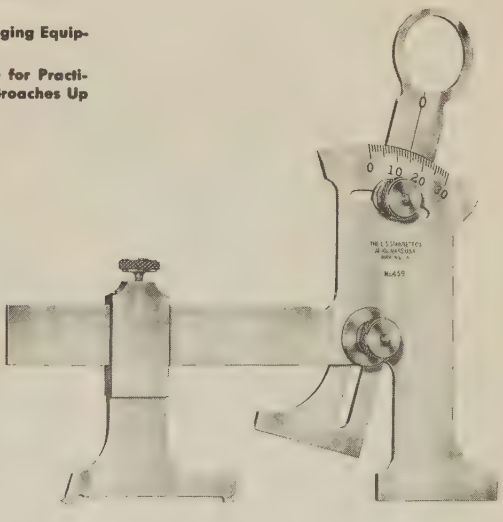
An auxiliary blade, also furnished, may be easily attached to the slotted blade and is clamped at any angle by a knurled nut. The stock is square at one end and is beveled 45 degrees at the other end. The auxiliary blade is beveled to 30 and 60 degrees at opposite ends. Stock and blades are approximately 4 inches long. Lies flat on the work. May be used with No. 193 Protractor.

Cutter Clearance Gage No. 459—*0 to 30 Degrees*

- ★ **Insures Correct Clearance Angles for Maximum Cutting Efficiency**
- ★ **Eliminates Guesswork and Elaborate Gaging Equipment**
- ★ **Highly Versatile—An All-Around Gage for Practically All Cutters, End Mills, Saws and Broaches Up to 30″ Diameter**



Checking the clearance angle of a 3.375" diameter 22 tooth helical cutter. The feet are positioned on alternate teeth and the adjustable blade set to contact the clearance angle of the center tooth at the required angle of 7°. The gage must be held at right angles to the cutter axis.



HIGHER production rates, improved accuracy, more work per "tool grind," and lower tool costs can be obtained in milling machine and planer-miller operations by use of the Starrett No. 459 Cutter Clearance Gage. This gage makes it possible in cutter grinding to accurately and quickly determine correct clearance angles for maximum cutting efficiency and eliminates guesswork.

The No. 459 Cutter Clearance Gage is highly versatile and will measure clearance angles from 0 to 30 degrees on helical, straight, side or inserted tooth milling cutters; straight or helical end mills; T-slot cutters; metal cutting saws; and also broaches. Can be used on cutters from 2 to 30 inches diameter or more and also small cutters and end mills from ½ to 2 inches if teeth are evenly spaced.

This gage is made of finest tool steel, hardened for long life, and is extremely easy to use. Consists of a frame graduated from 0 to 30 degrees and having a fixed foot, an adjustable sliding foot on the beam extension of the frame, and a blade which is adjustable angularly and perpendicularly to contact the clearance angle of any cutter tooth. To use the gage, the feet are positioned on two alternate teeth of the cutter with the gage at right angles to the cutter axis, and the adjustable blade, which is set at the correct clearance angle, tells at a glance when the cutter tooth is ground to the desired angle.

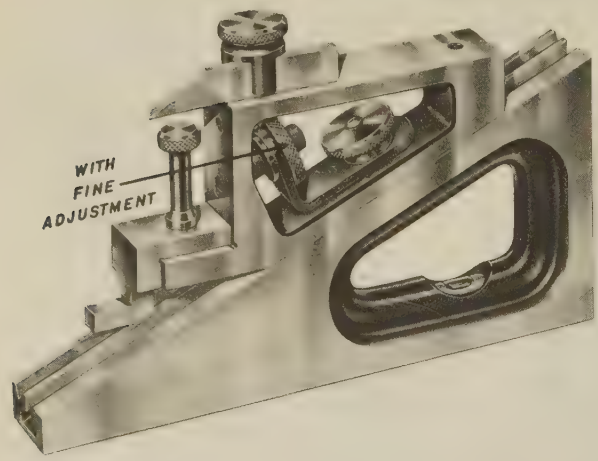
Without Case		In Case		Range	Range
Cat. No.	EDP No.	Cat. No.	EDP No.	Clearance Angles	Cutter Diameter
459	52431	459Z	52430	0 to 30°	Up to 30"

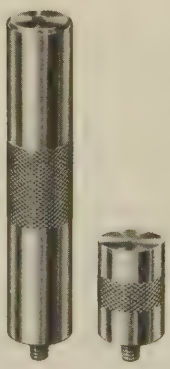
Furnished with Attractive, Protective Case Unless otherwise Ordered.
Packed One in a Box

Universal Precision Gage

10¼ Inch

No. 995





★ **Fine Adjustment—For Closer Accuracy, Faster Settings**
★ **Form Ground Flat and V Ways—Line Contact Without Side Play**
★ **Steel Forgings—Hardened and Ground**
★ **Inbuilt Precision Level**
★ **Scriber, Offset Attachment and 1″ Extension Also Available**

Specially designed for gage makers, inspectors, tool and die makers, and machinists, the new Starrett Universal Precision Gage combines the unique features of a long-desired fine adjustment and all-around versatility that now makes possible more accurate, faster settings on a wide variety of applications.

A quick easy adjustment of the knurled thumb screw—no slow tedious tapping of the slide—is all that's necessary to set this gage smoothly and precisely to the exact size required, either from a micrometer, height gage, vernier caliper or gage blocks. The clamping nut must be properly seated in the adjusting "L" hole and lightly tightened. After the gage is set by the fine adjustment, the clamp nut can be tightened to lock the slide securely in place. Both thumb screw and lock nut are smaller than the gage thickness, permitting the gage to be used on its sides without interference.

Besides sensitive adjustment, the gage has other features that make it truly universal. With the scribing attachment it can be used as a surface or height gage. A novel patent offset attachment or "foot" is also available that permits settings in narrow areas or working ⅛″ below the base line. The 3″ knurled extension provides increased range up to 9¼″ and with both 3″ and 1″ extensions, range up to 10¼″. An inbuilt level in the base is another desirable feature.

This versatile gage has many further useful applications. Use it as a planer and shaper gage; for gap measurement, face to face, etc.; as an adjustable parallel; for transferring settings with indicators; on surface plates or machine platens for checking and layout; as a height gage; as a scriber for setting up and leveling; with gage blocks or a sine bar. In all these applications, flush surfaces permit use on base, end, top of slide or sides.

The Universal Precision Gage is built to the highest standards of accuracy. Basic parts are made from steel forgings. All working surfaces are hardened and accurately ground to close limits for parallelism and alignment. An exclusive feature is the combination flat and "V" ways on the slide and base which are form ground. This provides superior line contact insuring accuracy in all positions with absolutely no side play. Approximate width of the gage is ¾″; length 5¼″. Capacity, with both extensions, 10¼″; without extensions, 6¼″.

(Continued on next page)

Universal Precision Gage

No. 995—*10¼ Inch*

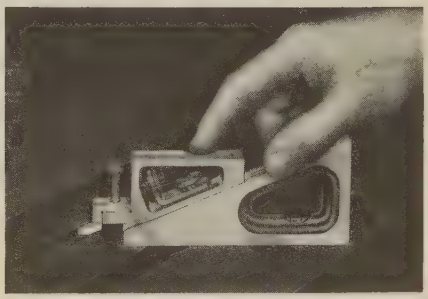
Cat. No.	EDP No.	Description	Range With 3" and 1" Extensions	Range Without Extensions
995AZ	53104	Gage with 3" Extension in Case	10¼"	6¼"
995A	53105	Gage with 3" Extension without Case		
995B	53106	Scriber and Scriber Holder only		
—	53107	Part No. 4349, Straight Scriber only		
995C	70486	1" Extension only		
995D	53109	Offset Attachment with Clamp Bolt		
995EZ	53110	Complete—Nos. 995A, B, C, D—in Case		
995E	53111	Complete—Nos. 995A, B, C, D—without Case		
711-49	52941	Attachment for Holding No. 711 Last Word® Dial Test Indicators		

NOTE: 25 mm Extension Also Available

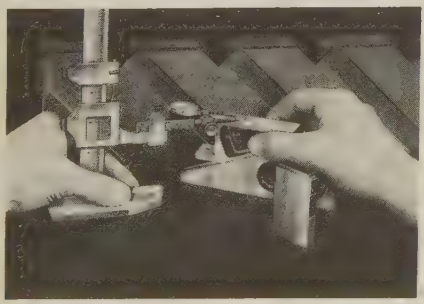
Sent with case unless otherwise ordered.

Packed One in a Box

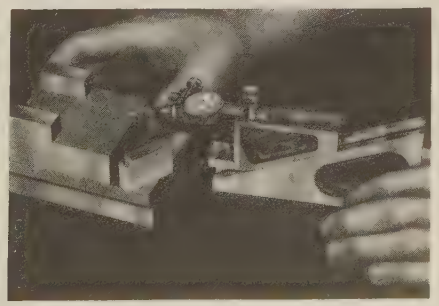
With the scriber attachment, the No. 995 can be used as a height gage or for scribing lines in layout work.



An offset attachment permits use of the No. 995 Gage for settings in narrow areas (above) or working ⅛" below the base line.



Another useful application of the No. 995—transferring settings with a Starrett Vernier Height Gage and "Last Word" Indicator.

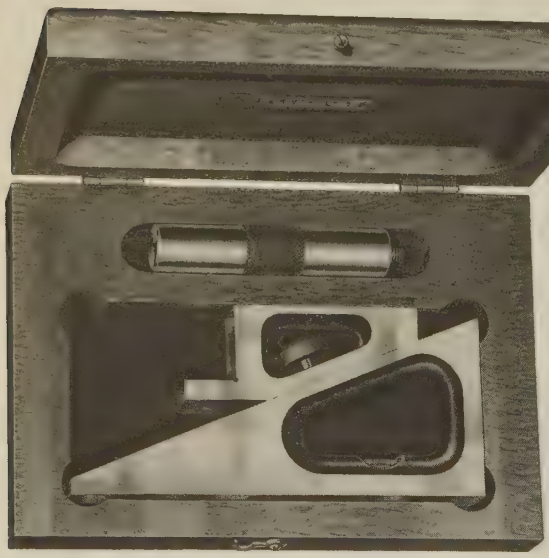


A highly useful gage is obtained by using the No. 995 with a "Last Word" Indicator and No. 49 attachment as shown above.

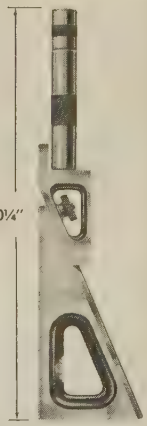
Planer and Shaper Gage

10¼ Inch

No. 599



Available in Finished Wood Case if desired.



Maximum range of 10¼ inches can be obtained by adjusting the gage to this position if used with the 3 inch and 1 inch extensions.

★ **Hardened and Ground—Forged Steel**
★ **Inbuilt Precision Level**

★ **Ground, Flat and V Ways Assure Accuracy—Eliminate Side Play**

The Starrett No. 599 Planer and Shaper Gage is designed and manufactured for fine gage work in addition to use on planer, shaper and other machine setups. All working surfaces are precision ground and held to close tolerances. An exclusive feature is the combination flat and "V" ways on the slide and base which are form ground. This provides superior line contact insuring accuracy in all positions with absolutely no side play.

Both sides are ground square with the working edges, and the gage can be used on its side as well as on its base and end as clamping nut and slide are within the limits of the base. Base is 5¼ inches long; ¾ inch wide and well balanced so as to avoid tipping action when setting to a cutting tool.

A 3-inch extension with knurled grip is furnished with each gage giving a range of ¼ inch to 9¼ inches. A 1-inch extension can also be furnished increasing the range to 10¼ inches. Base and slide are made from steel forgings and hardened. A level provided in the base is very handy for machine setups and gage work.

Cat. No.	EDP No.	Description	Range With 3" and 1" Extensions	Range Without Extensions
599	52627	Gage with 3" Extension	10¼"	6¼"
—	70486	Part No. 3476, 1" Extension only		

Attractive, Protective Case Also Available—

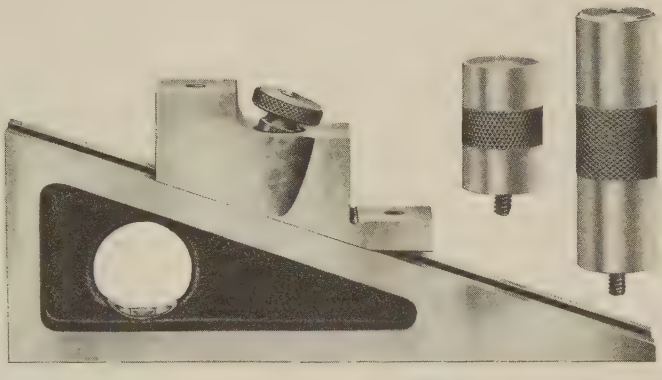
Sent Without Case Unless Otherwise Ordered

Packed One in a Box

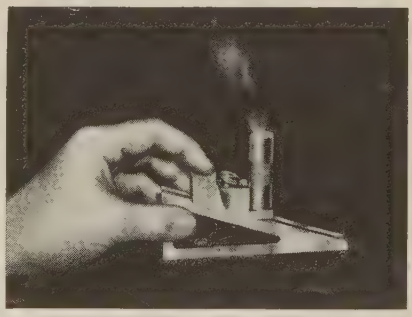
Planer and Shaper Gage

8⅛ Inch

No. 246



★ Base and Slide Made of Heat Treated Steel
★ Measuring and Way Surfaces Accurately Ground
★ Inbuilt Precision Level



A very convenient gage for setting the cutting tool on planers, shapers and other machine tools.

THIS gage greatly facilitates the setting of planer and shaper cutting tools in addition to its many other machine shop uses. By setting this gage to a micrometer, surface gage, or caliper and bringing the cutting tool in contact with it, the first cut may be absolutely relied upon. This of course reduces to a minimum the cut and try method, which is common in shops not equipped with this gage. The level in the base is handy for machine setup work.

Both the base and slide are steel specially heat-treated. All measuring surfaces are accurately ground. An exclusive feature is the combination flat and "V" ways on the slide and base which are form ground. This provides superior line contact insuring accuracy in all positions with absolutely no side play.

Range of gage is ¼ to 8⅛ inches. Base is 4⅝ inches long and ⅝ inch thick. It is regularly furnished with 1 inch and 2 inch extensions.

Cat. No.	EDP No.	Description	Range With 1" and 2" Extensions	Range Without Extensions
246	51172	Gage with 1" and 2" Extensions	8⅛"	5¼"

NOTE: 25 mm and 50 mm Extension, Also Available
Attractive, Protective Case Also Available—
Sent Without Case Unless Otherwise Ordered
Packed One in a Box

Drill Point Gage

59 Degrees

No. 22C

★ **Insures Correct Drill Point Angles of 59° for Better, Faster Cutting**

★ **Accurately Measures Drill Lip Lengths**

★ **An All-Around Tool—Also Can Be Used as Plain Rule, Hook Rule, Depth Gage, Try Square and Slide Caliper**

Designed specifically for use in drill grinding, Starrett No. 22C Drill Point Gage provides a quick, accurate tool for determining the correct drill point angle of 59 degrees and the correct length of drill lips necessary for clean-cut drilling at maximum feeds and speeds.

This gage consists of a six inch hook rule in combination with a sliding head which may be adjusted to any position along the rule and locked by a thumb nut. The head is beveled to 59 degrees, the correct drill point angle, and also is graduated in 32nds along the 59° face for measuring the drill lips which should be of equal lengths.

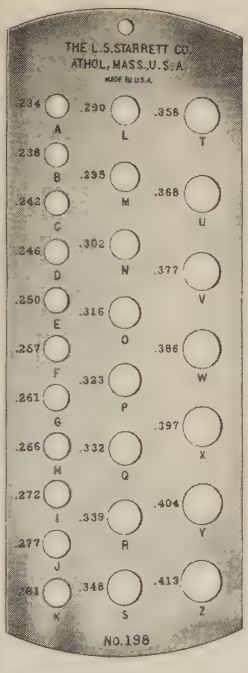
The hook rule has accurate machine divided graduations in 8ths, 16ths, Quick Reading 32nds and 64ths. Hook is adjustable and can be shortened or extended on either side of the rule, and may be removed entirely if desired.

Besides being a highly useful Drill Point Gage, this tool can also be used as a Plain Rule, Hook Rule, Depth Gage, Try Square and Slide Caliper. The No. 22D Head only will fit all steel rules ¾ inch wide by 5/64 inch thick.

ALSO SEE NO. 13 SQUARE (SEE INDEX FOR PAGE NUMBER)
ANOTHER USEFUL STARRETT TOOL FOR DRILL GRINDING

		Head		Hook Rule	
Cat. No.	**EDP No.**	**Bevel**	**Graduations**	**Length**	**Graduations**
22C	50150	59°	32nds	6″	8ths, 16ths, Quick Reading 32nds, 64ths
22D	50151	Sliding Head Only			

Packed One in a Box



Standard Letter Size Drill Gage

No. 198

Hardened

Range—A to Z

Letter size drills can be quickly and conveniently checked with this drill gage. Twenty-six gaging holes are provided giving corresponding drill sizes from "A" through "Z" with decimal equivalents from .234 inch diameter through .413 inch diameter.

The gage is approximately $\frac{7}{64}$ inch thick by $2\frac{9}{16}$ inches wide and $6\frac{1}{4}$ inches long. Hardened and has a satin finish. Thoroughly tested after hardening.

Cat. No.	EDP No.	Range Letter Drill Sizes
198	50718	A to Z

Packed Three in a Box

Tap and Drill Gage

No. 185 Time Saver®

Hardened

Range—Nos. 1 to 60

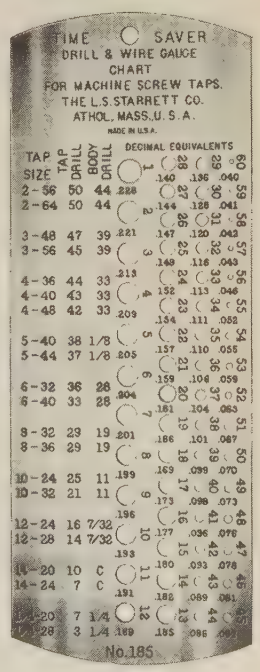
This highly useful gage shows at a glance the correct size tap drill for any common size machine screw tap in "NF" National Fine or "NC" National Coarse Thread Series and will leave the right amount of stock for approximately 65% full thread. The gage also shows the correct body size drill to use and in addition provides 60 holes marked with the number size and decimal equivalent of the drill that fits each hole. Example: a size 2-56 tap (no. 2 tap with 56 pitch) calls for a no. 50 tap drill and a no. 44 body drill.

The gage is thoroughly tested for accuracy after hardening and has an attractive satin finish. Approximate size, $\frac{7}{64}$ inches thick by $2\frac{9}{16}$ inches wide by $6\frac{1}{4}$ inches long.

Cat. No.	EDP No.	Tap Size	Range Tap Drill	Body Drill	Drill Gage Nos.
185	50675	2-56 to ¼-28	50 to 3	44 to ¼	1 to 60

NOTE: For Decimal Equivalents of the Numbers of Twist Drill Gage see Reference Tables.

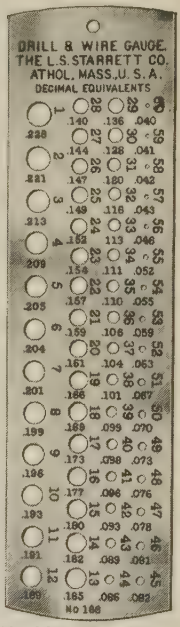
Packed Three in a Box



Drill and Steel Wire Gage

No. 186

Hardened—Range, Nos. 1 to 60

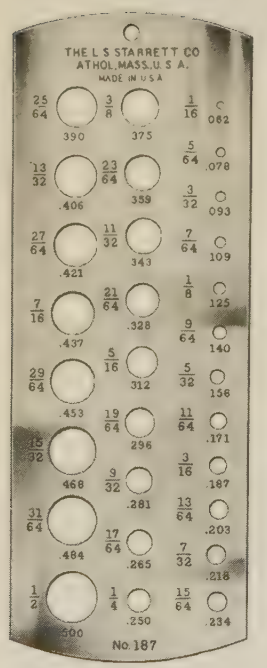


No. 186 Drill and Steel Wire Gage

Another handy Starrett gage widely used by mechanics for selecting the correct size of twist drills and steel drill rod. Has 60 holes for gaging drills from No. 1 to No. 60 and each hole is marked with the number size and decimal equivalent of the drill that fits each hole. The gage is thoroughly tested for accuracy after hardening. Attractive satin finish. Approximate size, 5/64ths inch thick, 1½ inches wide and 5½ inches long.

Cat. No.	EDP No.	Range, Drill Sizes
186	50676	Nos. 1 to 60

Packed Three in a Box



No. 187 Jobbers' Drill Gage

Jobbers' Drill Gage

No. 187

Hardened

Range—1/16 to ½ Inch

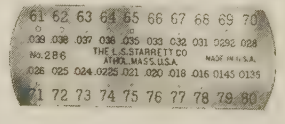
Using this gage, the size of any twist drill from 1/16 to ½ inch by 64ths can be quickly determined. The gage has a total of 29 holes each marked with the drill size in inches and the decimal equivalent. Rigidly tested after hardening and has an attractive satin finish. Approximately 5/64 inch thick by 2 9/16 inch wide by 6¼ inches long.

Cat. No.	EDP No.	Range, Drill Sizes
187	50677	1/16 to ½ inch

Packed Three in a Box

No. 286 Drill and Steel Wire Gage

Hardened—Range, Nos. 61 to 80



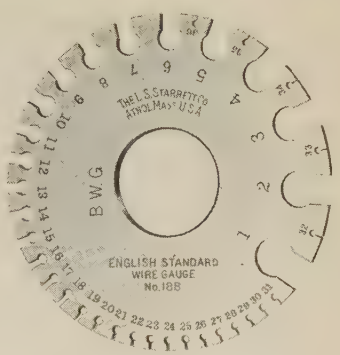
This gage is ideal for selecting the correct size of twist drills and steel drill rod in the smaller sizes ranging from Nos. 61 to 80. For convenience, each hole is marked with the size number and the corresponding decimal equivalent. Like other Starrett Gages, this tool is carefully tested for accuracy after hardening. Attractive satin finish. Small compact size, approximately 1/16 inch thick, ¾ inch wide, 2 inches long.

Cat. No.	EDP No.	Range, Drill Sizes
286	51320	Nos. 61 to 80

Packed Three in a Box

English Standard Wire Gage (Birmingham or Stubs' Iron Wire Gage) No. 188

Hardened—Range 1 to 36



A popular gage for gaging iron wire, hot and cold rolled sheet steel and in some cases sheet iron by the English Standard Wire system also known as Birmingham or Stubs.

The gage has convenient decimal equivalents of each number on the reverse side. Satin finish. Carefully tested after hardening.

Cat. No.	EDP No.	Range Gage Numbers	
188	50678	1 to 36	Packed Two in a Box

American Standard Wire Gage (or B.&S.) For Non-Ferrous Metals No. 281

Hardened—Range 0 to 36

This gage is the generally accepted standard for non-ferrous metals as adopted by brass manufacturers and is especially useful for electricians and others to gage sheets, plates and wire made of non-ferrous metals such as copper, brass, aluminum, etc. Screw Slotting Cutters are also made to this gage.

The gage has decimal equivalents on the reverse side. Satin finish. Completely tested after hardening.

Cat. No.	EDP No.	Range Gage Numbers	
281	51316	0 to 36	Packed Two in a Box

Steel Wire Gage

American Steel & Wire Co.'s (Washburn & Moen) Std.

No. 287

Hardened—Range 0 to 36

This gage is designed for gaging steel wire and drill rod to the American Steel & Wire Company (Washburn & Moen) Standard and checks sizes from 0 to 36. (Also known as United States Steel Wire Gage.) Decimal equivalents are given on the back. Satin finish. Carefully tested for accuracy after hardening.

Cat. No.	EDP No.	Range Gage Numbers	
287	51321	0 to 36	Packed Two in a Box

FOR COMPLETE INFORMATION ON STANDARD WIRE GAGES SEE REFERENCE TABLES

No. 295 Steel Music Wire Gage
American Steel and Wire Co. Standard

Hardened—Range 6-0 to 33

FOR measuring and checking steel music wire in all sizes from 6–0 to 33 gage. Convenient decimal equivalents of gage numbers are also stamped on the reverse side. This gage is $2\frac{5}{16}$ inches in diameter and has satin finish. Each gage carefully checked after hardening.

Cat. No.	EDP No.	Range Gage Numbers	
295	51326	6-0 to 33	Packed Two in a Box

No. 280 Piano Tuners' Gage
American Steel and Wire Co. Standard

Hardened—Range 12 to 28

THE No. 280 Gage is also designed for gaging steel music wire but is smaller than the No. 295 described above and has a range from No. 12 to 28. Convenient decimal equivalents on reverse side. Diameter of the gage is $1\frac{9}{16}$ inches and it has a satin finish. Carefully tested after hardening.

Cat. No.	EDP No.	Range Gage Numbers	
280	51315	12 to 28	Packed in a Box

U.S. Standard Gage
For Sheet and Plate Iron and Steel

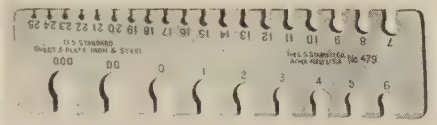
Hardened—Range 0 to 36

No. 283

THIS gage is made to the United States Standard, the recognized commercial standard in the United States for uncoated sheet, plate iron and steel, and is based on weights in ounces per square foot. The gage has satin finish and has decimal equivalents on the reverse side. Carefully tested after hardening.

Cat. No.	EDP No.	Range Gage Numbers	
283	51318	0 to 36	Packed Two in a Box

FOR COMPLETE INFORMATION ON STANDARD WIRE GAGES SEE REFERENCE TABLES



No. 479 Rolling Mill Gage in U.S. Standard is shown above.

Rolling Mill Gage For Wire and Sheet

Hardened

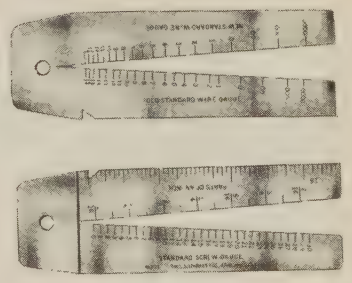
No. 479

RUGGED and accurate, this gage is especially designed for hard use in rolling mills and other places where constant measurements must be taken quickly. Available in U. S. Standard as listed below. Convenient decimal equivalents on reverse side. Made in satin finish and approximately 3/16 inch thick, 1 7/16 inches wide and 5 7/8 inches long. Hardened, tempered and every gage carefully tested.

Cat. No.	EDP No.	Gage Standard	Range Gage Numbers	
479	52489	U. S. Standard	000 to 25	Packed Three in a Box

FOR COMPLETE INFORMATION ON STANDARD WIRE GAGES SEE REFERENCE TABLES

Screw and Wire Gage—No. 227



A VERY handy gage easily carried in the pocket and extremely useful for measuring machine screws, wood screws and wire in stock rooms, hardware stores, etc.

The front side of the gage is graduated to measure all sizes of American Standard Screws (old style) from 0 to 30 and to measure diameters of screws or wire from 1/16 to 7/16 inch. This gage can also be used to measure American National numbered screws from 0 to 30 since there is only a slight difference from American Standard sizes. One edge of the gage on this side has a convenient 3½ inch scale graduated in 16ths for measuring screws. The scale is cut out at one end and square at the opposite end so that either countersunk or round head screws can be accurately positioned and measured for length.

Reverse side of the gage is graduated to measure the old standard, English Standard or Birmingham or Stubs' Iron Wire Gage, from 17 to 0000 and also to measure the American Standard Wire Gage (or B & S) from 15 to 0000.

The gage is precision made from the finest spring tempered steel and measures approximately 4½ inches long by 1 7/16 inches wide. Bright polished finish.

Cat. No.	EDP No.	Screw Gage	Range Wire Gage English Std.	Wire Gage American Std.
227	50919	0 to 30	17 to 0000	15 to 0000

Packed Three in a Box

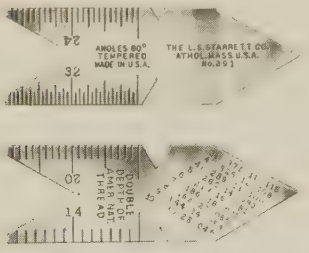
29° Screw Thread Gage
Acme Standard—Hardened
No. 284

THIS gage is a standard for grinding and setting tools when cutting Acme threads. Acme threads have the same depth as square threads but the sides of the thread are at an inclination of 14½° (29° included angle). This form of thread is used extensively at the present time and has in many instances replaced the square thread in machine construction. The advantages of the Acme thread are its strength and the ease with which it can be cut compared with the square threads. The angles and edges of this gage are hardened, ground and carefully tested.

Cat. No.	EDP No.	Range—Pitch
284	51319	1 to 10

NOTE: Also see Table of Thread Dimensions in Reference Tables.

Packed Six in a Box



No. C391 American National Center Gage illustrated above. SATIN CHROME Finish.

AN extremely handy gage for use in grinding and setting screw cutting tools. Available in three types as listed below—No. C391

Cat. No.	EDP No.	Description
C391	51475	Satin Chrome Finish, American National or U. S. Standard, 60°
C396	51477	Whitworth or English Standard 55°
C398M	51478	Metric Standard, 60°

Center Gages
No. C391, No. C396, No. C398M
English or Metric

SATIN CHROME Finish—
Ground Gaging Surfaces

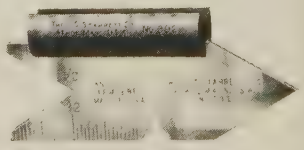
American National or U. S. 60° Standard, No. C396 Whitworth or English 55° Standard, and the No. C398M 60° Metric Standard.

These gages also have a very useful scale for finding the number of threads per inch by means of graduations in 14ths, 20ths, 24ths and 32nds of an inch on No. C391 and No. C396. Graduations on No. C398M are in mm and ½ mm. The No. C391 Gage has in addition a table of double depths of threads for determining size of tap drills.

Made of spring tempered steel with satin chrome finish. All gaging surfaces are ground.

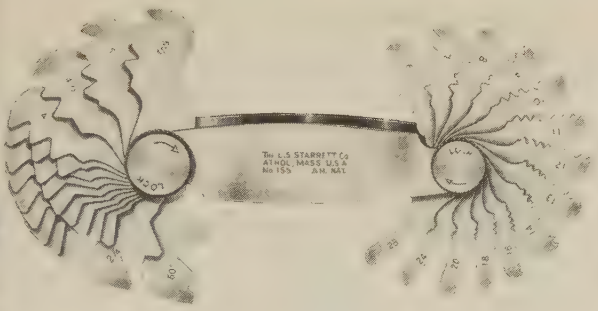
Packed Six in a Box

No. 392 Center Gage Attachment



THIS attachment is useful for holding the center gage firmly against the lathe arbor or face plate when setting both internal and external screw cutting tools. A slot containing a flat spring holds the gage and a V groove in the lower side permits locating the attachment against the lathe arbor.

Cat. No.	EDP No.	Description	
392	51476	Holds No. C391, C396 and C398M Center Gages	Packed Three in a Box



Starrett No. 155 Screw Pitch Gage with Locking Device and 60° Center Gage—V, American National and U. S. Standard 60° Threads—27 Pitches, Range 2¼ to 28 threads per inch.

Starrett No. 472 Screw Pitch Gage with Locking Devices—V, Unified, American National and U. S. Standard 60° Threads—51 Pitches, Range 4 to 84 threads per inch and also 11½ and 27 Pipe Thread Pitches.

Screw Pitch Gages

Starrett Screw Pitch Gages are among the most useful tools in any mechanics' tool box and make it possible to quickly determine the pitch of the various threads. These gages consist of a substantial steel case with a number of folding leaves at both ends, each leaf having teeth corresponding to a definite pitch. By matching the teeth with the thread on the work, the correct pitch can be read directly from the leaf.

Starrett Screw Pitch Gages are available in a wide range of sizes with different numbers of leaves in various pitch ranges to gage V, Unified, American National and U. S. Standard 60° threads; Whitworth Standard 55° threads; and Metric French Standard and International Standard 60° threads.

All Starrett Screw Pitch Gages (except No. 473, 475, 476 which have a Positive Stop design) feature a Locking Device at both ends of the case by means of which any leaf or leaves can be securely locked in position for use. Leaves on all gages have a special narrow design permitting checking internal threads in nuts, etc. as well as external threads.

Various types of Starrett Screw Pitch Gages are illustrated in the following pages and complete specifications will be found on page 196.

Starrett Screw Pitch Gages have the tops of the teeth flatted, a feature permitting use of a single gage for either National Form threads as illustrated above at the left or sharp V threads as shown at the right above.

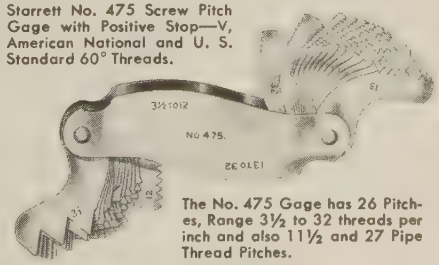
Formulas

V Thread $d = D - \frac{1.732}{N}$

Am. Nat. $d = D - \frac{1.299}{N}$

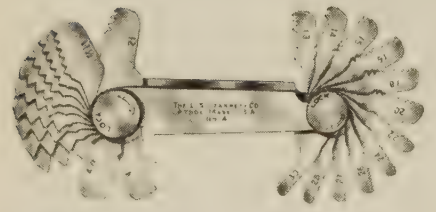
D = Outside diameter of tap; d = Bottom diameter of tap;
N = Number of threads per inch

Starrett No. 475 Screw Pitch Gage with Positive Stop—V, American National and U. S. Standard 60° Threads.

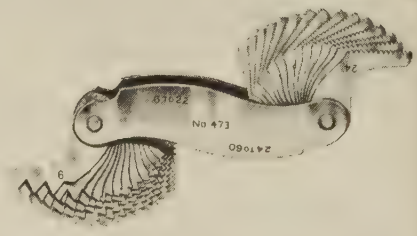


The No. 475 Gage has 26 Pitches, Range 3½ to 32 threads per inch and also 11½ and 27 Pipe Thread Pitches.

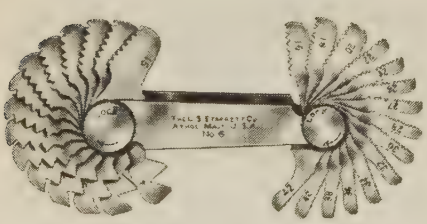
Screw Pitch Gages
V, Unified, American National
60° Threads



Starrett No. 4 Screw Pitch Gage with Locking Device—V, American National and U. S. Standard 60° Threads—24 Pitches, Range 4 to 30 threads per inch and also 11½ and 27 Pipe Thread Pitches.



Starrett No. 473 Screw Pitch Gage with Positive Stop—V, American National and U. S. Standard 60° Threads—30 Pitches, Range 6 to 60 threads per inch and also 11½ and 27 Pipe Thread Pitches.



Starrett No. 6 Screw Pitch Gage with Locking Device—V, American National and U. S. Standard 60° Threads—30 Pitches, Range 4 to 42 threads per inch, also 11½ and 27 Pipe Threads.

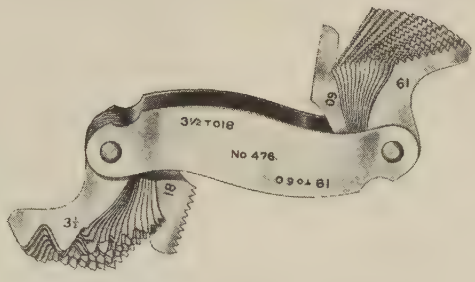
Starrett No. 40 Screw Pitch Gage with Locking Device—V, American National and U. S. Standard 60° Threads—22 Pitches, Range 9 to 40 threads per inch and 11½ and 27 Pipe Thread Pitches.

Starrett No. 474 Screw Pitch Gage with Locking Device—V, American National and U.S. Standard 60° Threads—28 Pitches, Range 4 to 80 threads per inch, also 11½ and 27 Pipe Thread Pitches.

FOR COMPLETE SPECIFICATIONS SEE PAGE 196

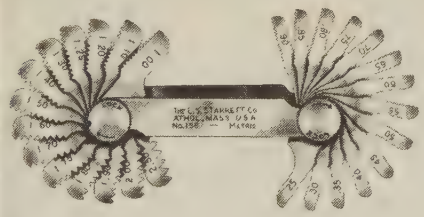
Screw Pitch Gages

Whitworth Standard—55° Threads



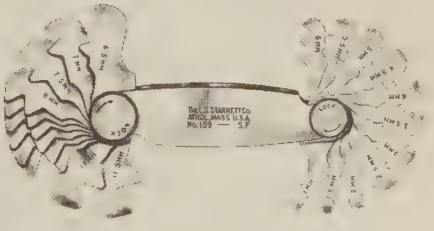
Starrett No. 476 Screw Pitch Gage with Positive Stop—Whitworth Standard 55° Threads—30 Pitches, Range 3½ to 60 threads per inch.

Metric—French Standard and International Standard—60° Threads



Starrett No. 156M Screw Pitch Gage with Locking Device—Metric French Standard and International Standard 60° Threads—28 Pitches, Range 0.25 to 2.50 mm.

Starrett No. 159M Screw Pitch Gage with Locking Device—Metric French Standard and International Standard 60° Threads—22 Pitches, 1 to 11.5 mm.



Starrett No. 158M Screw Pitch Gage with Locking Device and 60° Center Gage—Metric French Standard and International Standard 60° Threads—17 Pitches, Range 0.5 to 7 mm.

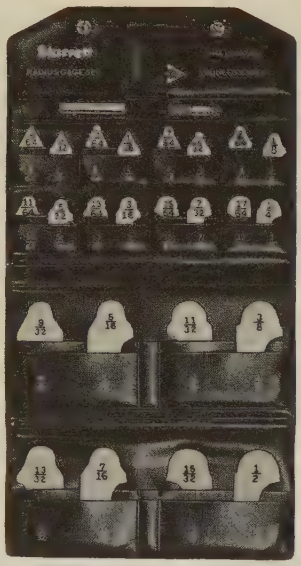
FOR COMPLETE SPECIFICATIONS SEE PAGE 196

Screw Pitch Gages
V, Unified, American National, Whitworth Standard and Metric

Cat. No.	EDP No.	Number of Leaves	Range of Threads	Threads per Inch	Description
			V, UNIFIED, AMERICAN NATIONAL—60° THREADS		
155	50588	27	2¼ to 28 threads per inch	2¼, 2⅜, 2½, 2⅝, 2¾, 2⅞, 3, 3¼, 3½, 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 24, 28	With Locking Device and 60° Center Gage
475	52487	26	3½ to 32 threads per inch	3½, 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32	With Positive Stop and 11½ and 27 Pipe Thread Pitches
4	50033	24	4 to 30 threads per inch	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30	With Locking Device and 11½ and 27 Pipe Thread Pitches
6	50035	30	4 to 42 threads per inch	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42	With Locking Device and 11½ and 27 Pipe Thread Pitches
474	52486	28	4 to 80 threads per inch	4, 4½, 5, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 16, 18, 20, 24, 27, 28, 32, 36, 40, 44, 48, 56, 64, 72, 80	With Locking Device and 11½ and 27 Pipe Thread Pitches
472	52484	51	4 to 84 threads per inch	First corner 17 leaves 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18 Second corner 17 leaves 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50 Third corner 17 leaves 52, 54, 56, 58 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84	With Locking Devices and 11½ and 27 Pipe Thread Pitches
473	52485	30	6 to 60 threads per inch	6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 48, 50, 56, 60	With Positive Stop and 11½ and 27 Pipe Thread Pitches
40	50261	22	9 to 40 threads per inch	9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40	With Locking Device and 11½ and 27 Pipe Thread Pitches
			WHITWORTH STANDARD—55° THREADS		
476	52488	30	3½ to 60 threads per inch	3½, 4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 36, 40, 44, 48, 50, 60	With Positive Stop
			METRIC—FRENCH STANDARD AND INTERNATIONAL STANDARD—60° THREADS		
			Range of Pitches	**Pitches in Millimeters**	
156M	50589	28	.25 to 2.50 millimeters	.25, .30, .35, .40, .45, .50, .55, .60, .65, .70, .75, .80, .85, .90, 1, 1.10, 1.20, 1.25, 1.30, 1.40, 1.50, 1.60, 1.70, 1.75, 1.80, 1.90, 2, 2.50	With Locking Device
158M	50590	17	0.5 to 7 millimeters	0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7	With Locking Device and 60° Center Gage
159M	50591	22	1 to 11.5 millimeters	1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11. 11.5,	With Locking Device

Packed 1 in a Box; 6 Boxes in a Carton

No. 472 Packed 1 in a Box; 3 Boxes in a Carton



Radius Gage Set No. S167CHZ illustrated above provides 25 gages and holder in a handsome, protective case. Case has provision for No. 110 Holder.

Radius Gages
Satin Finish Stainless Steel
No. 167 Series—1/64 to 1/2 inch
No. 167M Series—
0.5 to 15 mm (Metric)

- ★ Made of Satin Finish Stainless Steel—Rust and Stain Resistant
- ★ Wide Range of Sizes from 1/64 to 1/2 Inch Radius
- ★ Individual Gages Permit Each Gage To Be Used Separately for Greatest Accuracy and Convenience—Each Gage Marked with Radius
- ★ Five Different Gaging Surfaces on Each Gage for Both Convex and Concave Radii
- ★ Precision Finished Radii with Extra Smooth, Accurate Edges
- ★ Sets Available in Attractive Cases—Also with Handy Gage Holder

RADII or fillets from 1/64 to 1/2 inch can be checked or laid out easier, faster and more accurately in any machining, layout, inspection or pattern-making job with the new Starrett No. 167 Radius Gages. Ideal for inspectors, layout men, toolmakers, diemakers, machinists, screw machine operators, patternmakers and other mechanics.

Starrett No. 167 Radius Gages are made of Satin Finish Stainless Steel in a wide range of sizes with radii from 1/64 to 1/2 inch. Each of these sizes is an individual gage permitting every gage to be used separately for greatest accuracy and convenience. Each gage is clearly marked with its radius and has five different gaging surfaces for both convex and concave radii. All gages have precision finished radii with extra-smooth, accurate edges.

For maximum convenience, these gages are available in six different sets as listed on the next page. Each set is furnished in an attractive case which provides complete protection for these fine gages and makes possible easy, instant selection of the right size gage for any job.

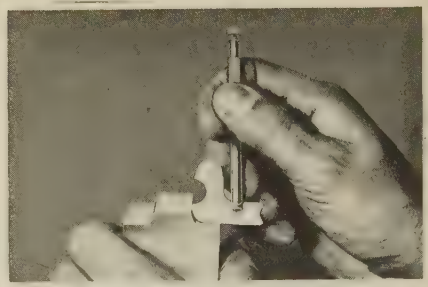
Any of the Radius Gage Sets listed on the next page can be furnished with the No. 110 Holder shown at the right. Especially useful for checking radii in confined or hard-to-reach locations. Gages are easily inserted in the slotted end of the holder and are rigidly clamped in place by a slight turn of the knurled nut at the end of the handle. Two slots are provided permitting gages to be held at 30 or 45 degrees, either square in the slot or tipped to one side. The holder is 4 inches long, providing good reach and balance.

Holder No. 110 with No. 167-1/4" Radius Gage shown above. Holder can be furnished separately or with any set listed on next page.

Nos. 167 and 167M Radius Gages

Five Different Gaging Surfaces—Ideal for Checking Convex and Concave Radii of All Types

1. Checking concave (internal) radius with 90° arc. Also checks if sides are tangent to radius and 90° to each other.



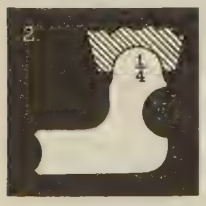
No. 167 Radius Gage in holder provides fast check of ¼" radii milled on this workpiece.

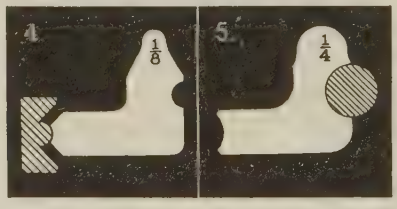
2. Checking concave (internal) radius with arc up to 180°. Also will check radius shown in fig. 1 but not relationship of sides.

3. Checking convex (external) radius with 90° arc. Also checks if sides are tangent to radius and 90° to each other.

4. Checking convex (external) radius with arc of 90° or greater, or radii with sides as shown which would interfere with gage used as in fig. 3.

5. Checking convex (external) radius with arc of 180°; also less than 180° if sides of radius offer no interference.





Cat. No.	EDP No.	Gages Per Set	Range, Radii	Description
S167AZ	50615	16	1/32 to 17/64 in. by 64ths	Without No. 110 Holder
S167AHZ	50616	17	1/64 to 17/64 in. by 64ths	With 1/64 in. Gage and No. 110 Holder
S167BZ	50617	8	9/32 to 1/2 in. by 32nds	Without No. 110 Holder
S167CZ	50618	24	1/32 to 17/64 in. by 64ths and 9/32 to 1/2 in. by 32nds	Consists of Sets Nos. 167A and No. S167B Combined, without No. 110 Holder
S167CHZ	50619	25	1/64 to 17/64 in. by 64ths and 9/32 to 1/2 in. by 32nds	Consists of Sets Nos. 167AH and No. S167B Combined, with 1/64 in. Gage and No. 110 Holder
S167DZ	50620	16	1/32 to 1/2 in. by 32nds	Without No. 110 Holder
			Metric	
S167MAZ	55817	13	1 mm to 7 mm by 0.5 mm	Without No. 110 Holder
S167MAHZ	55818	14	0.5 mm to 7 mm by 0.5 mm	With 0.5 mm Gage and No. 110 Holder
S167MBZ	55819	8	8 mm to 15 mm by 1 mm	Without No. 110 Holder
S167MCZ	55820	21	1 mm to 7 mm by 0.5 mm and 8 mm to 15 mm by 1 mm	Consists of Sets Nos. S167MA and S167MB Combined, without No. 110 Holder
S167MCHZ	55821	22	0.5 mm to 7 mm by 0.5 mm and 8 mm to 15 mm by 1 mm	Consists of Sets Nos. 167MB and S167MAH Combined, with 0.5 mm Gage and No. 110 Holder
S167MDZ	55822	15	1 mm to 15 mm by 1 mm	Without No. 110 Holder
110 Holder only	50475			

Extra Gages For Any of Above Sets Available Separately—See Next Page

All Sets Above Furnished in Attractive, Protective Case

Packed One in a Box

Nos. 167 and 167M Radius Gages continued

Individual Gages—English

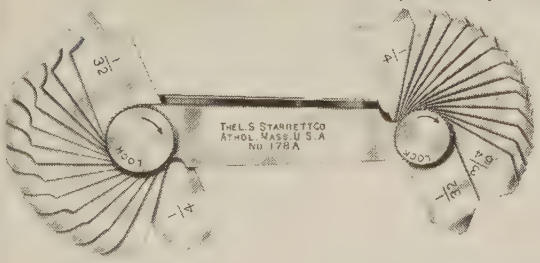
Cat. No.	EDP No.	Radius
167-1/64	50646	1/64"
167-1/32	50622	1/32"
167-3/64	50623	3/64"
167-1/16	50624	1/16"
167-5/64	50625	5/64"
167-3/32	50626	3/32"
167-7/64	50627	7/64"
167-1/8	50628	1/8"
167-9/64	50629	9/64"
167-5/32	50630	5/32"
167-11/64	50631	11/64"
167-3/16	50632	3/16"
167-13/64	50633	13/64"
167-7/32	50634	7/32"
167-15/64	50635	15/64"
167-1/4	50636	1/4"
167-17/64	50637	17/64"
167-9/32	50638	9/32"
167-5/16	50639	5/16"
167-11/32	50640	11/32"
167-3/8	50641	3/8"
167-13/32	50642	13/32"
167-7/16	50643	7/16"
167-15/32	50644	15/32"
167-1/2	50645	1/2"

Individual Gages—Metric

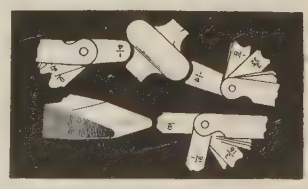
Cat. No.	EDP No.	Radius
167M-½	55795	.5 mm
167M-1	55796	1 mm
167M-1½	55797	1.5 mm
167M-2	55798	2 mm
167M-2½	55799	2.5 mm
167M-3	55800	3 mm
167M-3½	55801	3.5 mm
167M-4	55802	4 mm
167M-4½	55803	4.5 mm
167M-5	55804	5 mm
167M-5½	55805	5.5 mm
167M-6	55806	6 mm
167M-6½	55807	6.5 mm
167M-7	55808	7 mm
167M-8	55809	8 mm
167M-9	55810	9 mm
167M-10	55811	10 mm
167M-11	55812	11 mm
167M-12	55813	12 mm
167M-13	55814	13 mm
167M-14	55815	14 mm
167M-15	55816	15 mm

Packed One in an Envelope

No. 178 and No. 178M (Metric) Fillet or Radius Gages



With Locking Device



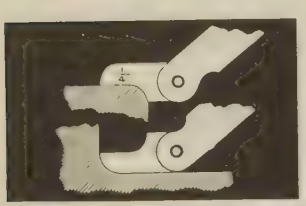
A VERY useful gage for tool and diemakers, machinists, screw machine operators, patternmakers, layout men and other mechanics to lay out and check radii of tools, dies, patterns, etc.

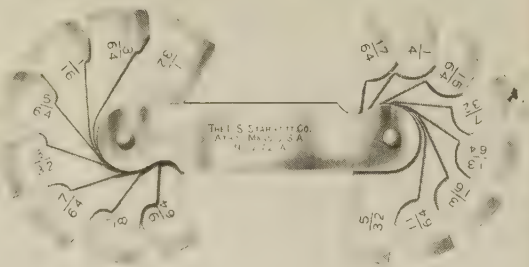
Made in two sizes and also Metric as listed below. Each gage has leaves for measuring both concave and convex radii with each leaf stamped with the radius size. Any one of the leaves can be securely locked in the desired position by a locking device. Made of finest steel and nicely finished.

Cat. No.	EDP No.	Number Leaves	Range Concave and Convex	Description
178A	50664	30	1/32 to 1/4 in. by 64ths	With Locking Device
178B	50666	32	17/64 to ½ in. by 64ths	With Locking Device
178MA	50665	34	1 to 7 mm; 1–3 mm by 0.25 mm; 3–7 mm by 0.5 mm	With Locking Device
178MB	50667	32	7.5 to 15 mm by 0.5 mm	With Locking Device

Packed One in a Box; Six Boxes in a Carton

No. 272 and No. 272M (Metric) Fillet or Radius Gages





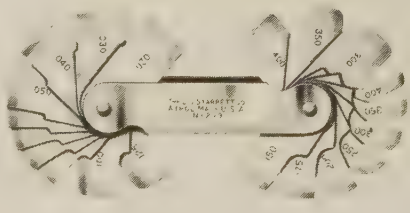
An external and internal radius on each leaf permits both concave and convex surfaces to be measured. The leaves are specially shaped so that they can be used in any position at any angle to measure fillets and radii in corners or against shoulders. Each leaf is also stamped with the radius size and has an eccentric mounting for clearance between the leaf and the case when the gage is opened.

Cat. No.	EDP No.	Number of Leaves	Range Concave and Convex
272A	51296	16	1/32" to 17/64" by 64ths
272B	51298	16	9/32" to 33/64" by 64ths
272MA	51297	18	0.75 to 5 mm by 0.25 mm
272MB	51299	16	5.5 to 13 mm by 0.5 mm

Packed One in a Box; Six Boxes in a Carton

No. 279 Fillet or Radius Gage

Similar to No. 272 except that it has twenty leaves with radii from .020 to .400 inch inclusive. Nine leaves have concave and convex radii from .020 to .100 inclusive by .010 inch, four leaves with concave and convex radii from.125 to .200 inclusive by .025 inch, one leaf with concave and convex radii of .250 inch, three leaves with concave radii only from .300 to .400 inclusive by .050 inch and three leaves with convex radii only from .300 to .400 by .050 inch



Cat. No.	EDP No.	No. Leaves	Range
279	51314	20	.020 to .400 inch

Packed One in a Box; Six Boxes in a Carton

No. 710 Ball and Diameter Gage

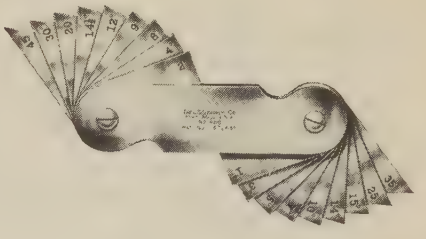
Used by tool and die makers to check roughing and finishing cutters. Covers practically the entire range of die sinkers' requirements and measures full diameters from 1/8" to 1" in steps of 32nds of an inch. Made of tough steel with bright finish. Diameters clearly marked. Approximate size, .050" thick, 1 3/8" wide and 11 3/8" long.

Cat. No.	EDP No.	Range
710	52917	29 diameters; 1/8" to 1" by 32nds

Packed One in a Package

No. 466 Angle Gage

Range—1 to 45 Degrees



A CONVENIENT tool and a real time saver for inspectors, toolmakers, and die sinkers in checking angles. In many instances takes the place of a protractor. The gage has 18 leaves each with a different angle including 14½° or ½ the Acme Standard (29°). Leaves are made of finest spring tempered steel and the angle edge as well as the two sides are ground. Approximately 9/32 inch thick, 1 1/16 inches wide and 4 3/16 inches long.

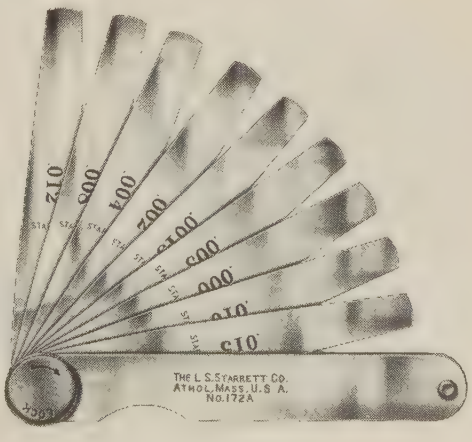
Cat. No.	EDP No.	Number Leaves	Range
466	52463	18	1-45°; 1°, 2°, 3°, 4°, 5°, 7°, 8°, 9°, 10°, 12°, 14°, 14½°, 15°, 20°, 25°, 30°, 35°, 45°

Packed One in a Box

Thickness Gages—English or Metric

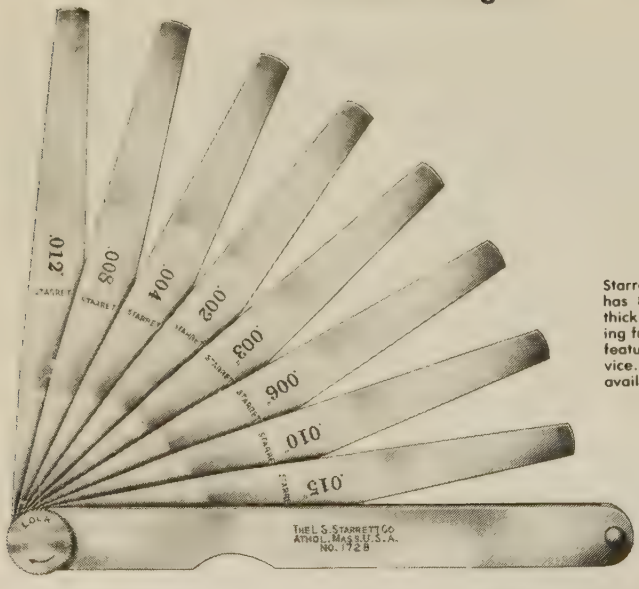
- ★ **Leaves made of finest tempered steel, carefully finished to correct thickness, individually tested and marked with thickness.**
- ★ **Locking Device on most gages—permits securely locking one or more leaves in any desired position.**
- ★ **Leaves easily removed or replaced.**
- ★ **Rugged, substantial steel case protects leaves at all times.**

Used in automotive, aviation, diesel and farm equipment manufacture and service, and also in jig, fixture, gage and experimental work. Particularly useful in adjusting tappets, spark plugs, distributor points, checking bearing clearances and gear play, fitting pistons, rings and pins, gaging narrow slots. Made in a wide range of types and sizes with 6 up to 26 leaves ranging from .0015 inch to .200 inch thick, straight or tapered, and in both English and Metric sizes as illustrated on the following pages and listed on page 204.



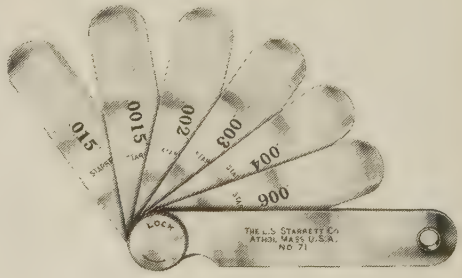
Starrett No. 172AT Thickness Gage has 9 tapered leaves ranging from .0015 to .015 inch thick, each ½ inch wide by 3 1/32 inches long. Features Locking Device. Leaves are replaceable. No. 172A available with straight leaves. Also available in Metric.

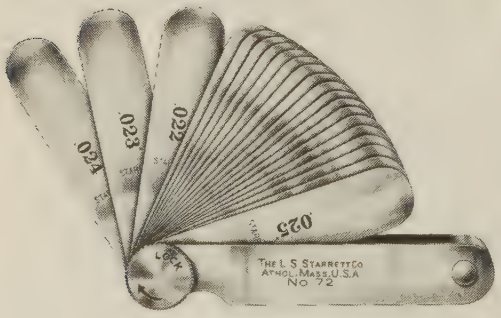
Thickness Gages



Starrett No. 172BT Thickness Gage has 8 leaves from .002" to .015" thick, each leaf 4½" long and tapering from ½" to ¼" wide. This gage features the Starrett Locking Device. Leaves are replaceable. Also available in metric.

Starrett No. 71 Thickness Gage has 6 leaves from .0015" to .015" thick. Leaves are ½" wide by 3 1/32" long. Furnished with Locking Device and with eyelet for carrying on a key-ring or hanging up. Leaves are replaceable.

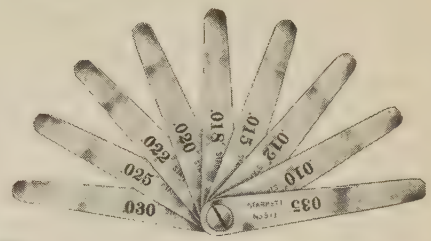




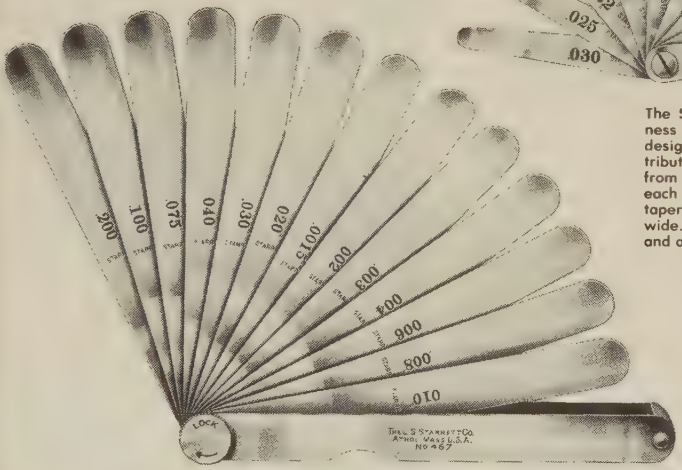
Starrett No. 72 Thickness Gage has 22 leaves ranging from .004" to .025" thick. Leaves are ½" wide by 3 1/32" long. Features Locking Device. Leaves are replaceable. This gage also available in metric.

FOR COMPLETE SPECIFICATIONS SEE PAGE 204

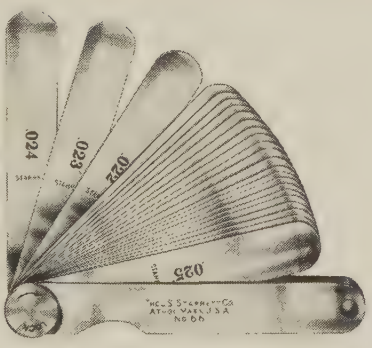
Thickness Gages



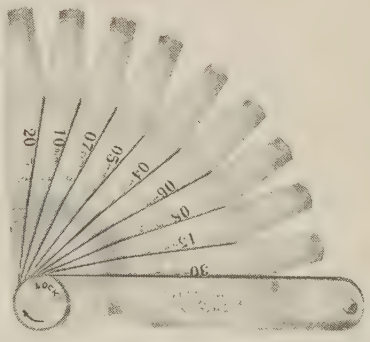
The Starrett No. 571AT Thickness Gage, above, is specially designed for ignition and distributor work. Has 9 leaves from .010 to .035 inch thick, each leaf $2^{1}/_{16}$ inches long and tapering from $^{3}/_{8}$ to $^{3}/_{16}$ inch wide. All leaves are hardened and are replaceable.



Starrett No. 467 Thickness Gage shown above has 13 leaves ranging from .0015 to .200 inch thick, each leaf ½ inch wide by 4½ inches long. Furnished with Locking Device. Leaves are replaceable. This gage also available in Metric.



Starrett No. 66 Thickness Gage illustrated above has 26 leaves from .0015 to .025 inch thick. Leaves are ½ inch wide by $3^{1}/_{32}$ inches long. Locking Device provided. Leaves are replaceable. Available with straight or tapered leaves.



Many Starrett Thickness Gages are also available in Metric sizes with leaf thickness in hundredths of a millimeter. The No. 172MAT Gage above, for example, has 9 leaves from 0.04 to 0.3 millimeters thick. Leaves are 77 mm long and are tapered from 12.7 to 7 mm wide. With Locking Device and replaceable leaves.

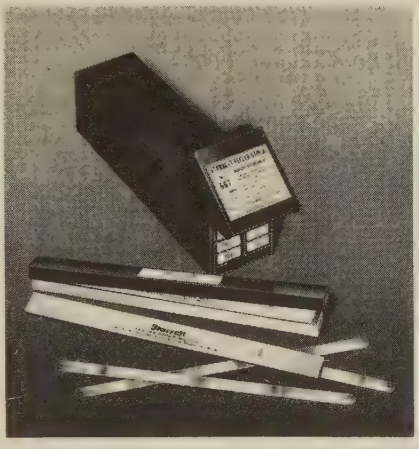
FOR COMPLETE SPECIFICATIONS SEE PAGE 204

Thickness Gages (English or Metric)

Cat. No.	EDP No.	Size Leaves	Number Leaves	Range Leaf Thicknesses	Description
			THICKNESS GAGES WITH STRAIGHT LEAVES		
71	50329	½" x 3 1/32"	6	.0015, .002, .003, .004, .006, .015 in.	With Locking Device and Eyelet
72	50330	½" x 3 1/32"	22	.004 to .025 in. by thousandths	With Locking Device
172A*	50649	½" x 3 1/32"	9	.0015, .002, .003, .004, .006, .008, .010, .012, .015 in.	With Locking Device
66*	50314	½" x 3 1/32"	26	.0015, .002, .0025, .003, .004, .005, .006, .007, .008, .009, .010, .011, .012, .013, .014, .015, .016, .017, .018, .019, .020, .021, .022, .023, .024, .025 in.	With Locking Device
66B	57097	½" x 3 1/32"	31	.0015, .002, .0025, .003, .004, .005, .006, .007, .008, .009, .010, .011, .012, .013, .014, .015, .016, .017, .018, .019, .020, .021, .022, .023, .024, .025, .026, .028, .030, .032, .035 in.	With Locking Device
467	52464	½" x 4½"	13	.0015, .002, .003, .004, .006, .008, .010, .020, .030, .040, .075, .100, .200 in.	With Locking Device
172D	50653	½" x 9"	8	.002, .003, .004, .005, .006, .008, .010, .015 in.	With Locking Device
172E	50654	½" x 12"	8	.002, .003, .004, .005, .006, .008, .010, .015 in.	With Locking Device
572A	57098	½" x 3 1/32"	22, plus 6 spark plug wire gages	.0015, .002, .0025, .003, .004, .005, .006, .007, .008, .009, .010, .012, .013, .014, .015, .016, .018, .020, .022, .025, .030, .035 in. .025, .030, .034, .035, .040, .045 in.	With Locking Device
572B	57099	½" x 3 1/32"	22	.0015, .002, .0025, .003, .004, .005, .006, .007, .008, .009, .010, .012, .013, .014, .015, .016, .018, .020, .022, .025, .030, .035 in.	With Locking Device
			THICKNESS GAGES WITH TAPERED LEAVES		
571AT	52598	3/8" to 3/16" x 2 1/16"	9	.010, .012, .015, .018, .020, .022, .025, .030, .035 in.	Hardened Leaves
571BT	52599	3/8" to 3/16" x 2 1/16"	10	.015, .016, .017, .019, .020, .021, .025, .030, .034, .035 in.	Hardened Leaves
66T*	50315	½" to ¼" x 3 1/32"	26	.0015, .002, .0025, .003, .004, .005, .006, .007, .008, .009, .010, .011, .012, .013, .014, .015, .016, .017, .018, .019, .020, .021, .022, .023, .024, .025 in.	With Locking Device
172AT*	50650	½" to ¼" x 3 1/32"	9	.0015, .002, .003, .004, .006, .008, .010, .012, .015 in.	With Locking Device
172BT	50651	½" to ¼" x 4½"	8	.002, .003, .004, .006, .008, .010, .012, .015 in.	With Locking Device
172CT	50652	½" to ¼" x 6"	8	.002, .003, .004, .006, .008, .010, .012, .015 in.	With Locking Device
			METRIC THICKNESS GAGES WITH STRAIGHT LEAVES		
72M	50331	12.7 mm x 77 mm	12	.04, .05, .06, .07, .08, .10, .15, .20, .30, 1.0, 2.0, 3.0 mm	With Locking Device
66MA	55974	12.7 mm x 77 mm	20	.05, .10, .15, .20, .25, .30, .35, .40, .45, .50, .55, .60, .65, .70, .75, .80, .85, .90, .95, 1.0 mm	With Locking Device
173MA	57086	12.7 mm x 77 mm	13	.03, .04, .05, .06, .07, .08, .09, .10, .15, .20, .30, .40, .50 mm	With Locking Device
467M	52465	12.7 mm x 114 mm	13	.04, .05, .06, .07, .08, .10, .15, .20, .30, 1.0, 2.0, 3.0, 5.0 mm	With Locking Device
			METRIC THICKNESS GAGES WITH TAPERED LEAVES		
172MAT	50655	12.7 mm to 7 mm x 77 mm	9	.04, .05, .06, .07, .08, .10, .15, .20, .30 mm	With Locking Device
172MBT	50656	12.7 mm to 7 mm x 114 mm	9	.04, .05, .06, .07, .08, .10, .15, .20, .30 mm	With Locking Device
172MCT	50657	12.7 mm to 7 mm x 152 mm	9	.04, .05, .06, .07, .08, .10, .15, .20, .30 mm	With Locking Device
173MAT	57087	12.7 mm to 7 mm x 77 mm	13	.03, .04, .05, .06, .07, .08, .09, .10, .15, .20, .30, .40, .50 mm	With Locking Device
173MCT	57088	12.7 mm to 7 mm x 1.52 mm	13	.03, .04, .05, .06, .07, .08, .09, .10, .15, .20, .30, .40, .50 mm	With Locking Device

*NOTE: No. 66 and No. 172A made with either straight or tapered leaves. Sent with straight leaves unless otherwise ordered. No. 66B straight leaves only.

NOTE: Thickness Gages are packed as follows:
No. 172E—One in an envelope, three in a box.
No. 172D, No. 571AT, No. 571BT—One in an envelope, six in a box.
No. 71—One in an envelope, six in a box. No. 467, No. 467M—One in a box. No. 66, No. 66M—One in a box, four boxes in a carton. No. 72, No. 72M, No. 172A, No. 172B, No. 172C, No. 172MA, No. 172MB, No. 172MC, No. 173MA, 173MAT, 173MCT, 572A, 572B—One in a box, six boxes in a carton.



Thickness Gage or Feeler Stock

No. 667

In 12 Inch and 30 cm (Metric) Lengths

- ★ Convenient 12 Inch Lengths, ½ Inch Wide
- ★ 32 Thicknesses Meet All Requirements
- ★ Rounded Ends—No Ragged Edges
- ★ Made of Finest Tempered Steel
- ★ Each Piece Marked with Thickness and in Individual Envelope
- ★ With Convenient 3/16" Hole Punched in End for Hanging Up
- ★ Popular Priced

Extremely useful for adjusting tappets, spark plugs, distributor points, checking bearing clearances and gear play, fitting pistons, rings and pins, gaging narrow slots. Widely used in automotive, aviation, diesel and farm equipment manufacture and service, also in jig, fixture, gage and experimental work.

Furnished in convenient 12" lengths ½" wide in 32 different thicknesses ranging from .001" up to .030" thick. Also available in metric in 304 mm lengths 12.7 mm wide. Made of finest tempered steel and carefully finished to size. Ends are rounded, no ragged edges. Convenient 3/16" hole punched in end permits hanging up. Each piece is marked with its thickness and is furnished in an individual envelope.

12" Lengths

Cat. No.	EDP No.	Thickness
667-1	52837	.001"
667-1½	52838	.0015"
667-2	52839	.002"
667-2½	52840	.0025"
667-3	52841	.003"
667-4	52842	.004"
667-5	52843	.005"
667-6	52844	.006"
667-7	52845	.007"
667-8	52846	.008"
667-9	52847	.009"
667-10	52848	.010"
667-11	52849	.011"
667-12	52850	.012"
667-13	52851	.013"
667-14	52852	.014"

Cat. No.	EDP No.	Thickness
667-15	52853	.015"
667-16	52854	.016"
667-17	52855	.017"
667-18	52856	.018"
667-19	52857	.019"
667-20	52858	.020"
667-21	52859	.021"
667-22	52860	.022"
667-23	52861	.023"
667-24	52862	.024"
667-25	52863	.025"
667-26	52864	.026"
667-27	52865	.027"
667-28	52866	.028"
667-29	52867	.029"
667-30	52868	.030"

304 mm Lengths

Cat. No.	EDP No.	Thickness
667M-3	52869	.03 mm
667M-4	52870	.04 mm
667M-5	52871	.05 mm
667M-6	52872	.06 mm
667M-8	52873	.08 mm
667M-10	52874	.10 mm
667M-15	52875	.15 mm
667M-20	52876	.20 mm
667M-25	52877	.25 mm
667M-30	52878	.30 mm
667M-35	52879	.35 mm
667M-40	52880	.40 mm
667M-45	52881	.45 mm
667M-50	52882	.50 mm

Packed 12 Pieces of a Size in a Box; Each Piece in Individual Envelope

(Continued on next page)

Thickness Gage or Feeler Stock No. 667—Continued
Display Assortment

The assortment, illustrated at the top of the preceding page, consists of 108 pieces, ½" x 12", in nine different thicknesses from .0015" to .015" thick. Twelve pieces of each thickness are packed in a box and each piece in an individual envelope. The nine boxes together with an extra box for holding odd pieces are packed in an attractive point-of-sale display carton for use by distributors and dealers.

Cat. No.	EDP No.	Description
667D	32883	Display Assortment 108 Pieces in Nine Thickness Sizes; 12 Pieces of a Size per Box; .0015, .002, .003, .004, .006, .008, .010, .012, .015"

Packed 12 Pieces of a Size in a Box; Each Piece in Individual Envelope; 9 Boxes in a Carton

Thickness Gage or Feeler Stock
No. 666

In 25 Foot Rolls and 7.6 Meter (Metric) Rolls in Rewind Dispenser Case

- ★ **Handy 25 Foot Roll*, ½ Inch Wide, in Compact Rewind Dispenser Case**
- ★ **Rewind Feature Permits Retracting Feeler Stock into Case Preventing Damage.**
- ★ **27 Thicknesses Meet All Requirements**
- ★ **Made of Finest Tempered Steel**
- ★ **Marked Every 6 inches with a Line, Thickness in Thousandths and the name Starrett**
- ★ **Popular Priced**

STARRETT No. 666 Thickness Gage or Feeler Stock is furnished in convenient 25 foot rolls, ½ inch wide, in a compact, handy, rewind dispenser case. Thicknesses of .016" and over furnished in 20 ft. rolls in cardboard box. The stock is marked every six inches with a line, the thickness in thousandths and the name Starrett, thus permitting easy, accurate snipping off the length desired without waste, by the distributor or in the tool crib for the mechanic. The rewind feature permits easier retraction of the feeler stock into the case preventing possible damage.

No. 666 Thickness Gage Stock is available in 27 different thicknesses, from .001 to .025 inch thick. (Also available in Metric in 7.6 m rolls.) Made of finest tempered steel carefully finished to size.

This stock is extensively used in automotive, aviation, Diesel and farm equipment manufacture and service, and also in jig, fixture, gage and experimental work.

Highly useful for adjusting tappets, spark plugs, distributor points, checking bearing clearances and gear play, fitting pistons, rings and pins, gaging narrow slots etc.

*NOTE: Roll stock in thicknesses of .016 in. or .40 mm and over furnished in 20 ft. (6.1 m) rolls in cardboard box.

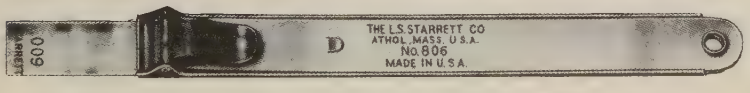
Thickness Gage or Feeler Stock No. 666—Continued

No. 666 THICKNESS GAGE STOCK IN 25 FT. ROLLS In Rewind Dispenser Case			No. 666 THICKNESS GAGE STOCK IN 20 FT. ROLLS In Cardboard Box			No. 666M METRIC THICKNESS GAGE STOCK IN 25 FT. (7.6 M) ROLLS In Rewind Dispenser Case		
Cat. No.	EDP No.	Thickness	Cat. No.	EDP No.	Thickness	Cat. No.	EDP No.	Thickness
666-1	52796	.001"	666-16	52813	.016"	666M-3	52823	.03 mm
666-1½	52797	.0015"	666-17	52814	.017"	666M-4	52824	.04 mm
666-2	52798	.002"	666-18	52815	.018"	666M-5	52825	.05 mm
666-2½	52799	.0025"	666-19	52816	.019"	666M-6	52826	.06 mm
666-3	52800	.003"	666-20	52817	.020"	666M-8	52827	.08 mm
666-4	52801	.004"	666-21	52818	.021"	666M-10	52828	.10 mm
666-5	52802	.005"	666-22	52819	.022"	666M-15	52829	.15 mm
666-6	52803	.006"	666-23	52820	.023"	666M-20	52830	.20 mm
666-7	52804	.007"	666-24	52821	.024"	666M-25	52831	.25 mm
666-8	52805	.008"	666-25	52822	.025"	666M-30	52832	.30 mm
666-9	52806	.009"				666M-35	52833	.35 mm
666-10	52807	.010"				IN 20 FT. (6.1 M) ROLLS In Cardboard Box		
666-11	52808	.011"						
666-12	52809	.012"				666M-40	52834	.40 mm
666-13	52810	.013"				666M-45	52835	.45 mm
666-14	52811	.014"				666M-50	52836	.50 mm
666-15	52812	.015"						

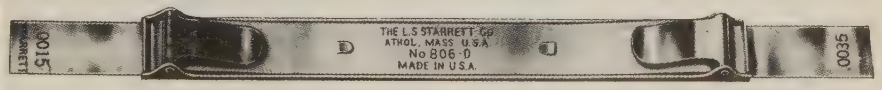
Packed One Rewind Dispenser in a Box

Thickness Gage Holders

No. 806 Series



No. 806 Thickness Gage Holder Clamps Stock at One End

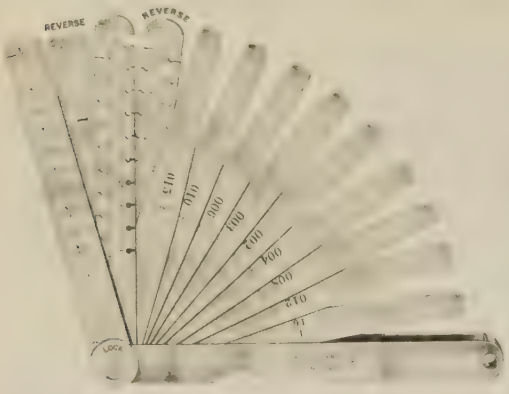


No. 806D Thickness Gage Holder Clamps Stock at Both Ends

STARRETT No. 806 Thickness Gage Holders provide a handy, convenient means of holding single leaves or strips of thickness gage stock of any thickness from .001 to .025 inch. Stock up to 6 inches long is easily inserted in the holder and is firmly gripped in the desired position by a cam lock. This permits every bit of stock to be used since, as it wears from use, the defective end can be snipped off and new stock pulled out until entirely used up. Available in two types as listed below either to clamp stock at one end or both ends. Dull nickel finish. Size, approximately 3/32 inch thick, 9/16 inch wide and 5¼ inches long.

Cat. No.	EDP No.	Description
806	53039	Holder only—clamps stock at one end
806D	53040	Holder only—clamps stock at both ends

Packed Six in a Box



Engineers' Taper, Wire and Thickness Gage
No. 245
No. 245M (Metric)

Consists of a wire gage, a taper gage for measuring slot widths and an assortment of thickness gage leaves, all folding within a compact steel case. The gage measures ½" wide by 4¾" long and has a locking device to lock any leaf or leaves in position.

Both No. 245 and No. 245M have an English Standard wire gage leaf with sizes numbered from 19 to 36 plus two additional sizes, 1/16" and ⅛". The reverse side gives decimal equivalents in thousandths.

No. 245 has a taper gage leaf for measuring slot widths from 1/64" to 3/16" in 64ths of an inch, the reverse side having a 3" scale graduated in 8ths and 16ths. It has nine thickness or feeler leaves as follows: .002, .003, .004, .006, .008, .010, .012, .015 and 1/16 inch.

No. 245M has a taper gage leaf for measuring slot widths from 0.5 mm to 5 mm in 0.5 mm, the reverse side having an 80 mm scale graduated in mm and ½ mm. It has eleven thickness or feeler leaves as follows: 0.04, 0.05, 0.06, 0.07, 0.08, 0.10, 0.15, 0.20, 0.30, 1 and 2 millimeters.

Cat. No.	EDP No.	Description
245	51170	With taper gage, English Standard wire gage and 9 thickness gage leaves
245M	51171	With taper gage, English Standard wire gage and 11 thickness gage leaves

Packed One in a Box

Taper Gage
No. 269 Series—*1/10 to 1 Inch*
No. 269M Series—*2 to 25mm*

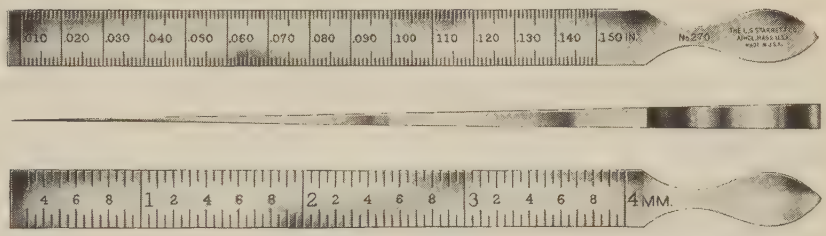
For determining hole size in dies and all kinds of other work. Reads in thousandths of an inch. All sizes are made from spring tempered steel approximately .012" thick and have a locking device which makes it possible to lock any leaf in position for use.

Cat. No.	EDP No.	Leaves	Range	Length
269A	51290	8	1/10 to ½ inch in .001"	2½"
269B	51291	10	½ to 1 inch in .001"	2¾"
269MA	56031	10	2 to 12 mm	63.5mm
269MB	56032	13	12 to 25 mm	69.9mm

Furnished in Attractive, Protective Case
Packed One in a Box

Taper Gage

No. 270—.010 to .150 Inch and 0.3 to 4 mm



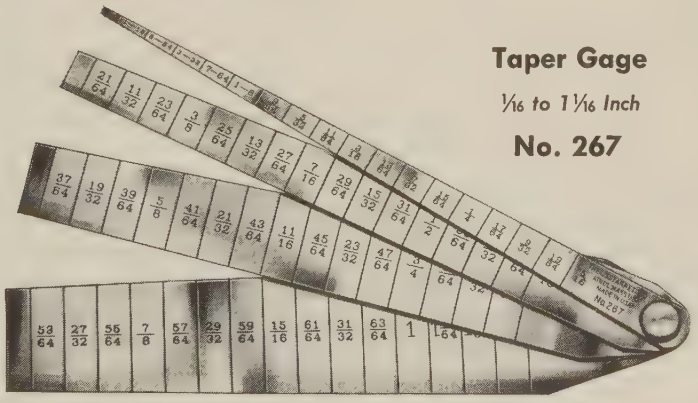
THE Starrett No. 270 Taper Gage is a highly useful tool especially valuable on bearing work and for gaging slots.

The gage is made of quality tool steel 7/16 inch wide by 6¼ inches long and is accurately tapered throughout its entire length for quick, convenient measuring of slot widths, etc.

One side is graduated from .010 inch to .150 inch in thousandths and the reverse side from 0.3 mm to 4 mm in one-twentieth of a mm (.05 mm).

Cat. No.	EDP No.	Range
270	51292	.010 to .150" one side; 0.3 to 4 mm reverse side

Packed One in a Box



Taper Gage

1/16 to 1 1/16 Inch

No. 267

THIS gage is specially designed for brass and steel tubing manufacturers for rapid, accurate checking of inside diameters of tubing. Also very useful for all-around mechanics' use to measure slot widths, hole sizes, setting calipers, etc.

This gage has thin tapered leaves graduated to measure diameters or widths from 1/16 up to 1 1/16 inches in 64ths of an inch. Nicely finished and made of spring tempered steel. Approximately 1 inch wide by 5¼ inches long.

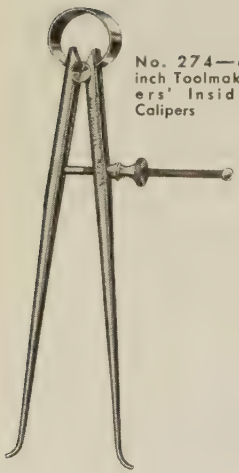
Cat. No.	EDP No.	Range—Inside Diameter or Width
267	51286	1/16 to 1 1/16 inch

Packed One in a Box

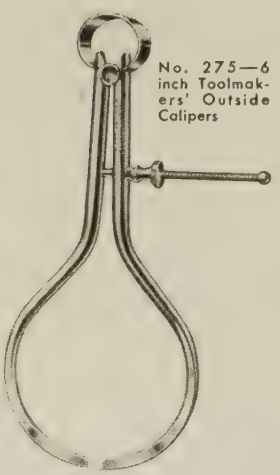
Toolmakers' Spring Type Calipers and Dividers

With Round Legs—Solid Nut
2 to 6 Inch

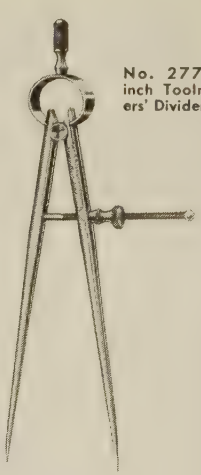
No. 274—No. 275—No. 277 Series



No. 274—6 inch Toolmakers' Inside Calipers



No. 275—6 inch Toolmakers' Outside Calipers



No. 277—6 inch Toolmakers' Dividers

STARRETT Toolmakers' Calipers and Dividers are the finest tools of their type. Designed for toolmakers and all good mechanics who require a tool with finer adjustment and better balance with which a more sensitive "feel" can be obtained. Precision made to rigid Starrett standards throughout.

The legs are made from round stock which is drawn down to a smooth taper. The fulcrum stud is hardened, the bearing surfaces of the legs are sufficiently large to prevent any side deflection. The bow spring is strong and flexible, and the adjustment is centrally located in the legs to assure smooth action.

Inside Calipers		Outside Calipers		Dividers		
Cat. No.	**EDP No.**	**Cat. No.**	**EDP No.**	**Cat. No.**	**EDP No.**	**Size**
274-2	51300	**275-2**	51304	**277-2**	51308	2″
274-3	51301	**275-3**	51305	**277-3**	51309	3″
274-4	51302	**275-4**	51306	**277-4**	51310	4″
274-6	51303	**275-6**	51307	**277-6**	51311	6″

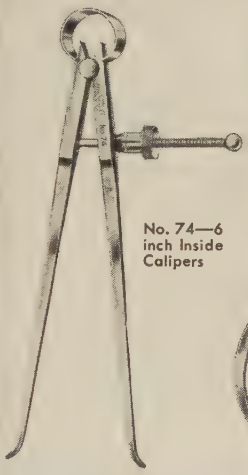
Duplicate Parts Also Available; For Prices Write for Duplicate Parts Booklet

Packed Three in a Box

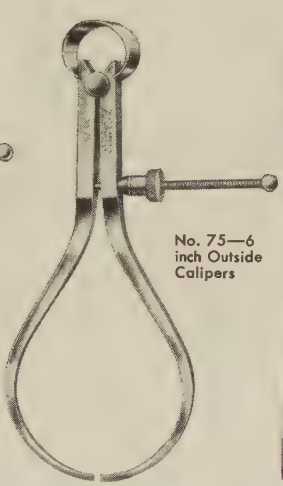
"Fay" Spring Type Calipers and Dividers

With Quick Spring Nut or Solid Nut—3 to 6 Inch

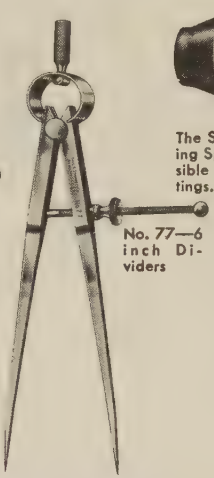
No. 74—No. 75—No. 77 Series



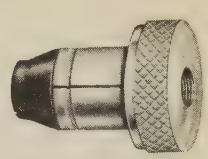
No. 74—6 inch Inside Calipers



No. 75—6 inch Outside Calipers



No. 77—6 inch Dividers



The Starrett Quick-Adjusting Spring Nut makes possible rapid accurate settings. Saves valuable time.

STARRETT "Fay" Calipers and Dividers are exceptionally rugged in construction. The legs are made from heavy square stock and machined to a smooth taper. The fulcrum stud is hardened and has an exceptionally large bearing surface to prevent side deflection of the legs. The bow spring is both strong and flexible, and the adjustment screw is centrally located in the legs to assure smooth action. All sizes can be furnished with either spring nut or solid nut, but the spring nut is sent unless otherwise ordered.

The Starrett quick-adjusting automatic closing spring nut is designed for making quick positive adjustments. The threads of the nut firmly engage the screw at the slightest pressure from the leg and when the pressure is withdrawn, the nut releases itself sliding freely over the screw. This feature makes possible rapid, accurate settings and saves valuable time.

Solid Nut		Spring Nut		
Cat. No.	EDP No.	Cat. No.	EDP No.	Size
		Inside Calipers		
74A-3	50345	**74B-3**	50344	3″
74A-4	50347	**74B-4**	50346	4″
74A-6	50349	**74B-6**	50348	6″
		Outside Calipers		
75A-3	50351	**75B-3**	50350	3″
75A-4	50353	**75B-4**	50352	4″
75A-6	50355	**75B-6**	50354	6″
		Dividers		
77A-3	50357	**77B-3**	50356	3″
77A-4	50359	**77B-4**	50358	4″
77A-6	50361	**77B-6**	50360	6″

Sent With Spring Nut Unless Otherwise Ordered

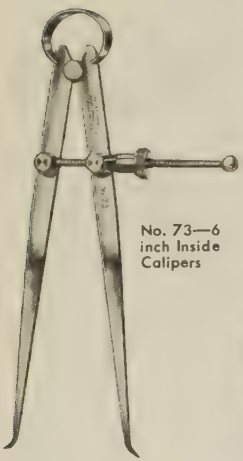
Duplicate Parts Also Available—For Prices Write for Duplicate Parts Booklet

Packed Three in a Box

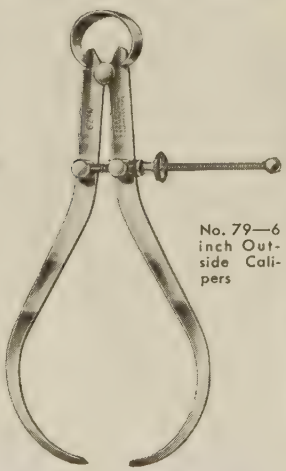
"Yankee" Spring Type Calipers and Dividers

With Quick Spring Nut or Solid Nut—3 to 12 Inch

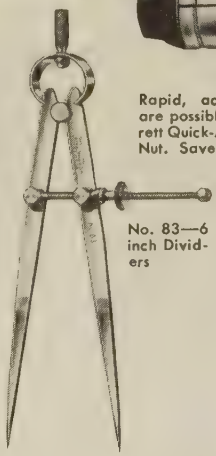
No. 73—No. 79—No. 83 Series



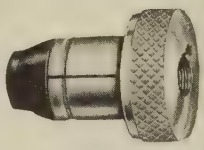
No. 73—6 inch Inside Calipers



No. 79—6 inch Outside Calipers



No. 83—6 inch Dividers



Rapid, accurate settings are possible with the Starrett Quick-Adjusting Spring Nut. Saves valuable time.

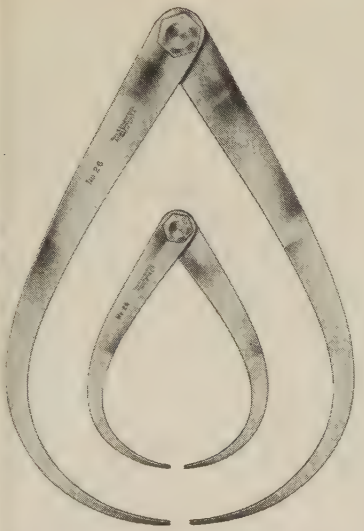
Starrett "Yankee" Calipers and Dividers are made from a high grade steel and well finished. The legs are made of flat stock and are very durable. The fulcrum stud is hardened and has a smooth bearing surface. The bow spring, although flexible, is exceedingly strong to assure reliability.

All sizes can be furnished with either spring nut or solid nut, but the solid nut is sent unless otherwise ordered. The Starrett quick-adjusting, automatic closing spring nut is designed for making quick, positive adjustments. The threads of the nut firmly engage the screw at the slightest pressure of the leg, and when the pressure is withdrawn, the nut releases itself sliding freely over the screw. This feature makes it possible to rapidly use calipers and dividers and saves time in opening and closing.

Solid Nut		Spring Nut		
Cat. No.	EDP No.	Cat. No.	EDP No.	Size
Inside Calipers				
73A-3	50332	**73B-3**	50333	3″
73A-4	50334	**73B-4**	50335	4″
73A-6	50336	**73B-6**	50337	6″
73A-8	50338	**73B-8**	50339	8″
73A-10	50340	**73B-10**	50341	10″
73A-12	50342	**73B-12**	50343	12″
Outside Calipers				
79A-3	50362	**79B-3**	50363	3″
79A-4	50364	**79B-4**	50365	4″
79A-6	50366	**79B-6**	50367	6″

Solid Nut		Spring Nut		
Cat. No.	EDP No.	Cat. No.	EDP No.	Size
Outside Calipers				
79A-8	50368	**79B-8**	50369	8″
79A-10	50370	**79B-10**	50371	10″
79A-12	50372	**79B-12**	50373	12″
Dividers				
83A-3	50374	**83B-3**	50375	3″
83A-4	50376	**83B-4**	50377	4″
83A-6	50378	**83B-6**	50379	6″
83A-8	50380	**83B-8**	50381	8″
83A-10	50382	**83B-10**	50383	10″
83A-12	50384	**83B-12**	50385	12″

Sent With Solid Nut Unless Otherwise Ordered
Duplicate Parts Also Available—For Price Write for Duplicate Parts Booklet
Packed Three in a Box



No. 26—6 inch and 12 inch Firm Joint Outside Calipers shown above

Improved Firm Joint Type Outside and Inside Calipers

6 to 36 Inch

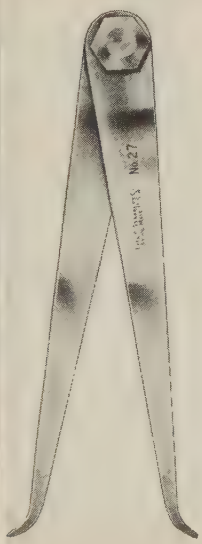
No. 26—No. 27 Series

STARRETT Firm Joint Calipers have an improved joint which is constructed so that the tension can be adjusted to the requirements of the user. After proper adjustment has been made, the tension will not change with the opening and closing of the legs.

The legs are made from a high grade steel, are rugged in construction, and well finished.

The sizes listed below are the lengths of the legs. Their capacity is about one-third greater than the given size of the legs; for example, the 36-inch size will caliper 46 inches diameter.

No. 27—6 inch Firm Joint Inside Caliper shown below



Inside Calipers Cat. No.	EDP No.	Outside Calipers Cat. No.	EDP No.	Size
27-6	50193	**26-6**	50186	6″
27-8	50194	**26-8**	50187	8″
27-10	50195	**26-10**	50188	10″
27-12	50196	**26-12**	50189	12″
27-18	50197	**26-18**	50190	18″
27-24	50198	**26-24**	50191	24″
.....		**26-36**	50192	36″

Calipers 6″–12″ Packed Three in a Box; 18″–24″ Packed One in a Box; 36″ Packed One in a Package

Lock Joint Type
Outside and Inside Calipers

6 to 24 Inch

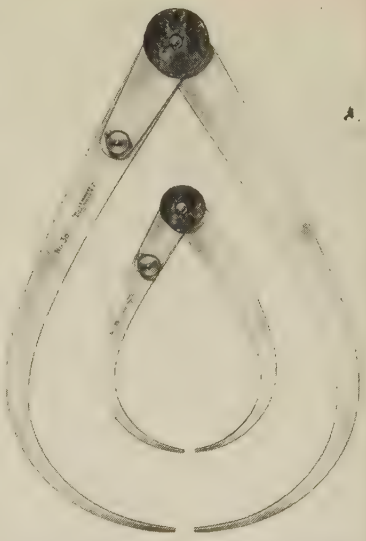
No. 38—No. 39 Series

STARRETT Lock-Joint Calipers feature a joint which can be quickly and firmly locked by a partial turn of the large knurled disc. A spring washer under the disc maintains proper tension of the legs when the joint is unlocked.

These calipers are also provided with an adjusting screw to permit close adjustments for fine measurements. After the legs have been set to approximate size and the joint locked, the final adjustment is made by a few turns of the knurled adjusting nut.

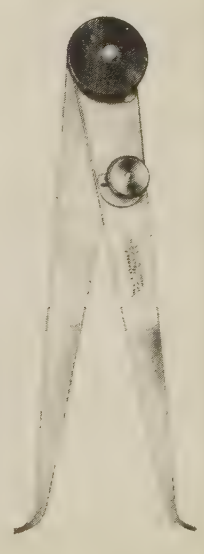
The legs are made from a high grade steel and well shaped. They are rugged in construction and nicely finished.

The sizes listed below are leg lengths. Their capacity is about one-third greater than the given size of the legs.



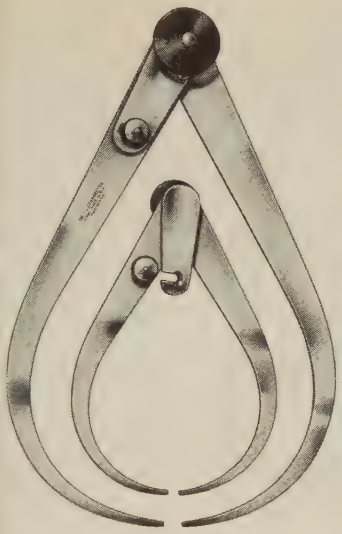
No. 38—6 inch and 12 inch Lock Joint Outside Calipers shown above

No. 39—6 Inch Lock Joint Inside Caliper shown below



Inside Calipers Cat. No.	EDP No.	Outside Calipers Cat. No.	EDP No.	Size
39-6	50257	**38-6**	50253	6″
39-12	50258	**38-12**	50254	12″
39-18	50259	**38-18**	50255	18″
39-24	50260	**38-24**	50256	24″

Calipers 6″—12″ Packed Three in a Box; 18″—24″ Packed One in a Box



No. 36—6 inch and 12 inch
Lock Joint Transfer Outside Calipers

Lock Joint Transfer Type Outside and Inside Calipers

6 to 24 Inch

No. 36—No. 37 Series

STARRETT Lock Joint Transfer Calipers have three outstanding features consisting of a transfer arm, fine adjustment screw, and locking joint.

The transfer arm makes it possible to transfer measurements from the inside of chambered cavities, over flanges and other places where it is necessary to move the legs after they have been set to size. Simply lock the joint, loosen the transfer arm binding nut and swing the leg out or in to clear the obstruction; then move it back against the transfer arm stop and the exact size can then be transferred to a rule or gage.

The adjusting screw permits close adjustments for fine measurements. After the legs have been set to approximate size and the joint locked, the final adjustment is made by a few turns of the knurled adjusting nut. The joint can be quickly and firmly locked by a partial turn of the large knurled disc. A spring washer under the disc maintains proper tension of the legs when the joint is loosened.

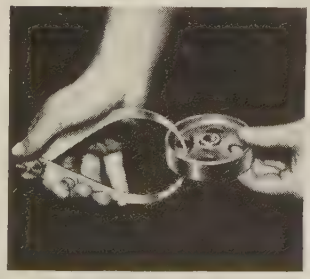
The legs are made from a high grade steel and are well shaped. They are rugged in construction and nicely finished.

The sizes listed below are the length of the legs. Their capacity is about one-third greater than the given size of the legs.

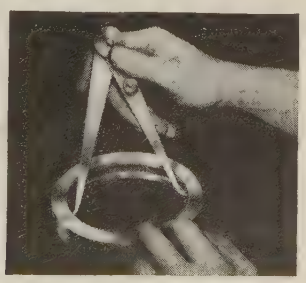
No. 37—6 inch Lock Joint Transfer Inside Caliper

Inside Calipers Cat. No.	Inside Calipers EDP No.	Outside Calipers Cat. No.	Outside Calipers EDP No.	Size
37-6	50249	**36-6**	50245	6″
37-12	50250	**36-12**	50246	12″
37-18	50251	**36-18**	50247	18″
37-24	50252	**36-24**	50248	24″

Calipers 6″–12″ Packed Three in a Box—18″–24″ Packed One in a Box



Measuring inside the rim of a pulley using No. 36 Lock-Joint Transfer Calipers.

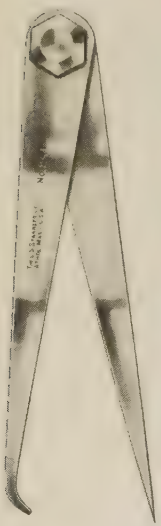


Checking depth of inside groove with No. 37 Lock-Joint Transfer Calipers.

Hermaphrodite Calipers

Starrett Hermaphrodite Calipers are used in layout work for locating and testing centers, laying off distances from an edge, etc. Those shown on this and the following page comprise a very complete line from which machinists and toolmakers can select the type best suited for their particular requirements. The legs are made from a high grade steel and well shaped. They are rugged in construction and nicely finished.

The sizes listed are the lengths of the legs. Their capacity is about one-third greater than the given size of the legs.



Firm Joint Hermaphrodite Calipers
No. 241 Series—*6 Inch*

BOTH legs of Starrett No. 241 Calipers are solid. They have the improved firm joint feature which makes it possible to adjust the joint to any desired tension.

Cat. No.	EDP No.	Size
241	51141	6″

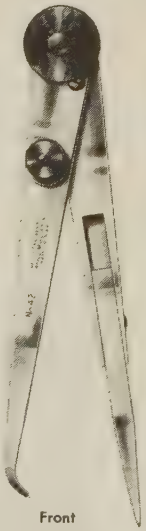
Packed Three in a Box

Lock Joint Hermaphrodite Calipers
No. 42 Series—*6 to 8 Inch*

THESE Hermaphrodite Calipers have an adjustable point, locking joint and close adjustment feature for fine measurements. After the legs have been set to approximate size and the joint locked, the final adjustment is made by a few turns of the knurled adjusting nut.

Cat. No.	EDP No.	Size	Cat No.	EDP No.	Size
42-6	50263	6″	**42-8**	50264	8″

Packed Three in a Box



Front

Reverse

Reverse

Front

Firm Joint Hermaphrodite Calipers

4 to 6 Inch

No. 243 Series

STARRETT No. 243 Calipers feature an improved firm joint and also a round adjustable leg. The leg which holds the adjustable point is offset.

Cat. No.	EDP No.	Size	Cat. No.	EDP No.	Size
243-4	51142	4″	**243-6**	51143	6″

Packed Three in a Box

Firm Joint Hermaphrodite Calipers

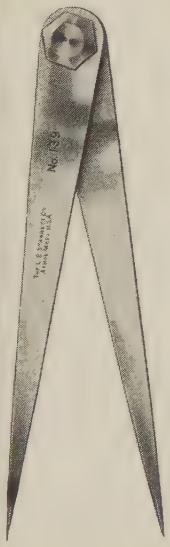
4 to 6 Inch

No. 563 Series

THESE Calipers have a round adjustable point held by a straight leg. They also have the improved firm joint feature making it possible to adjust the joint to any desired tension.

Cat. No.	EDP No.	Size	Cat. No.	EDP No.	Size
563-4	52571	4″	**563-6**	52572	6″

Packed Three in a Box



Firm Joint Dividers

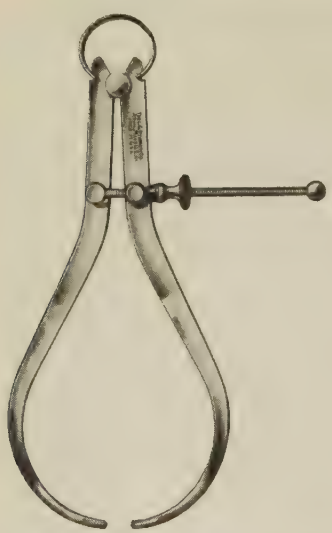
6 to 12 Inch

No. 139 Series

THE legs of these Dividers are made from a high grade steel, are well shaped and very rigid. The points are hardened and nicely finished. The improved firm joint feature makes it possible to adjust the joint to any desired tension.

Cat. No.	EDP No.	Size	Cat. No.	EDP No.	Size
139-6	50573	6″	**139-12**	50574	12″

Packed Three in a Box

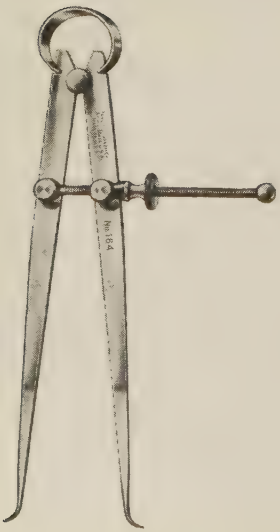


No. 179—6 inch Outside Thread Calipers

Thread Calipers
Outside and Inside
4 and 6 Inch
No. 179—No. 184 Series

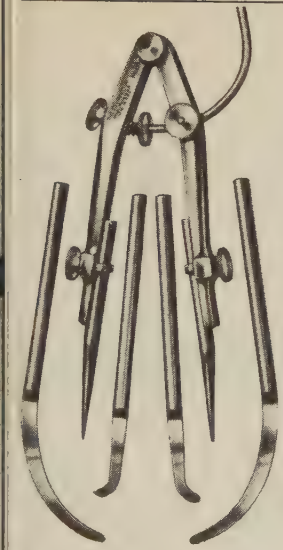
STARRETT Thread Calipers are designed for measuring screw threads. The measuring points of the No. 179 are tapered for measuring outside threads, and the points of the No. 184 are shaped for measuring inside threads. These calipers are made from a high grade steel and well finished. The fulcrum stud is hardened and has a smooth bearing surface. The bow spring, although flexible, is exceedingly strong to assure reliability. Furnished with solid nut only. Available in 4 inch and 6 inch sizes as listed below.

No. 184—6 inch Inside Thread Calipers



Inside Calipers Cat. No.	EDP No.	Outside Calipers Cat. No.	EDP No.	Size
184-4	50673	179-4	50668	4″
184-6	50674	179-6	50669	6″

Furnished Only with Solid Nut—Packed Three in a Box



No. 85—9 inch Divider complete with inside and outside caliper legs shown above.

Improved Extension Dividers

No. 85 Series—*7 to 12 Inch*

The Starrett No. 85 Extension Divider is exceptionally rigid although light in weight and easy to handle. The head is made of forged steel. The points are hardened and well shaped.

The sturdy construction of the joint, combined with the quadrant which projects through the legs and is frictionally locked by a knurled clamp nut, eliminates side deflection of the legs. A quadrant adjusting nut permits fine adjustments for close measurements. A check nut located between the legs firmly locks the legs after proper adjustment has been made. This feature overcomes the possibility of the legs moving in and out when scribing on wood or sliding off rough spots when scribing on metal.

Inside and outside caliper legs are furnished when required. A common pencil fits either arm. No. 88 Ball Points as shown on page 220 may also be used with this divider.

The 7 inch size will scribe a 22 inch circle. The auxiliary legs will caliper 11 inches outside and 13 inches inside. The 9 inch size will scribe a 30 inch circle. The auxiliary caliper legs will caliper 14 inches outside and 16 inches inside. The 12 inch size will scribe a 40 inch circle. The auxiliary caliper legs will caliper 17 inches outside and 19 inches inside.

Cat. No.	EDP No.	Size	Description
85A	50398	7″	With Divider Legs only
85B	50399	9″	With Divider Legs only
85C	50400	7″	Complete with Divider Legs, Inside and Outside Caliper Legs
85D	50401	9″	Complete with Divider Legs, Inside and Outside Caliper Legs
85E	50402	12″	With Divider Legs only
85F	50403	12″	Complete with Divider Legs, Inside and Outside Caliper Legs

No. 85C Sent Unless Otherwise Ordered—Packed One in a Box

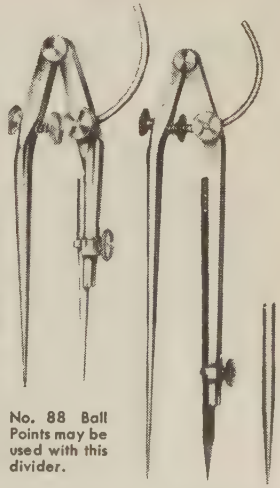
Dividers—No. 92 Series—*6 to 9-Inch*

This Divider combines rigidity, light weight and easy handling. The legs are forged steel, well shaped, properly tempered and highly polished. The adjustable point may be instantly removed and a common pencil inserted in its place. The No. 92-9″ size is specially designed for use with a standard long pencil and is particularly useful for carpenters.

The sturdy construction of the joint, combined with the quadrant which extends through the legs and is frictionally locked by a knurled clamp nut, eliminates side deflection of the legs. A quadrant adjusting nut permits fine adjustments for close measurements. A check nut located between the legs locks the legs firmly after the proper adjustment has been made. This feature overcomes the possibility of the legs moving in and out with the grain when scribing wood or sliding off rough spots when scribing on metals.

Cat. No.	EDP No.	Size	Cat. No.	EDP No.	Size
92-6	50423	6″	92-8	50425	8″
92-7	50424	7″	92-9	50426	9″

Packed One in a Box



No. 88 Ball Points may be used with this divider.

The 92-9″ size shown right can be used with a long pencil and therefore extremely useful for carpenters.

Pencil Divider, No. 596—*3¼ Inch*

The legs are made from round stock, and each leg is provided with a small chuck for holding steel points and pencil lead. (We do not furnish the pencil leads). One leg is provided with a cutout so that broken or lodged leads can be removed. The distance between the points is approximately 3/16" closed and 3¼" open. The distance from the fulcrum to scriber points is about 3¼".

The bow spring although flexible is exceedingly strong to assure reliability. The legs are well shaped and have a bright nickel-plated finish.

Cat. No.	EDP No.	Size	Hole Dia. in Chuck
596A	52626	3¼"	.086"
596B	52625	3¼"	.076"

NOTE: No. 596A Sent Unless Otherwise Ordered.
Packed Two in a Box

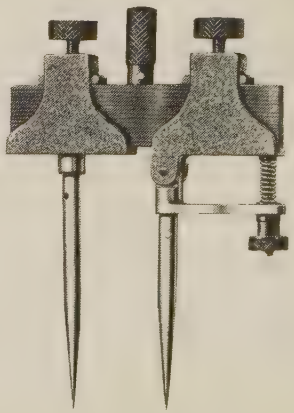
Ball Points, No. 88 Series—*7 or 9 Inch*

Used with dividers and trammels when it is necessary to use a hole as a center point for layout, scribing, and measuring. The Ball Point is placed in the hole and bears against the edge forming a seat for the divider leg or tram. The set consists of either a 7" or 9" holder with four balls. The balls are 1/16, 1, ¾, ½" diameter respectively. They are not recommended for exceptionally close work as it is impossible to keep them exactly in the center of the hole.

Cat. No.	EDP No.	Holder	Balls	For Use With
88A Complete	50410	7"	Four (½", ¾", 1", 1 1/16")	No. 85A, C; No. 92-6", 7", 8"
88B Complete	50411	9"	Four (½", ¾", 1", 1 1/16")	No. 85B, D, E, F; No. 92-9"
88C	72005	½" Ball Only		
88D	72006	¾" Ball Only		
88E	72007	1" Ball Only		
88F	72008	1 1/16" Ball Only		
88G	72009	7" Long Holder Only		
88H	72010	9" Long Holder Only		

Packed One in a Box

Improved Trammels, No. 50 Series



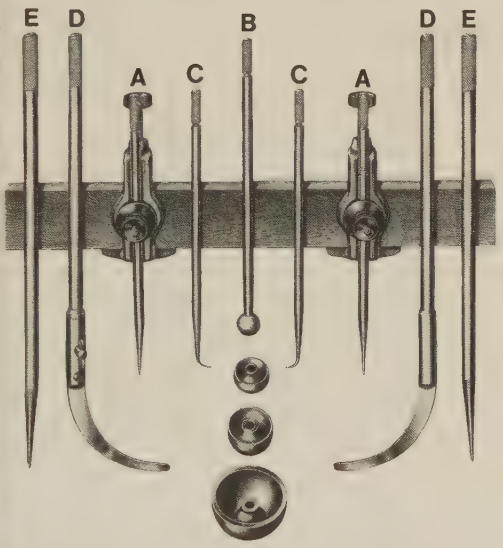
Used to measure the distance between points that are too great to be reached with dividers. They are die cast with black wrinkle finish and have hardened, forged steel points. The points screw into the heads, and the pencil socket accompanying each set of trammels can be used in place of either point. No. 50A has an adjustable point. A beam is not furnished with these trammels. The heads accommodate a beam ⅜ inch thick and ¾ inch wide.

Cat. No.	EDP No.	Description
50A	50268	3" Points—Adjustable
50B	50269	3" Points—Not Adjustable
50CA	50270	5" Points Only (Set) For No. 50A
50CB	50271	5" Points Only (Set) For No. 50B

No. 50A Sent Unless Otherwise Ordered
Packed One in a Box

Trammels

No. 59 Series



★ **A Very Useful Tool for Laying Out and Scribing Circles Beyond the Capacity of Regular Dividers**

★ **Available with Divider Points only or with All Attachments Illustrated**

The No. 59F Set Complete shown at left

STARRETT No. 59 Trammels are very handy for laying out and for scribing circles beyond the capacity of ordinary dividers. The trammel consists of two heads, each with a clamping device that firmly holds various auxiliaries designed to make this a most useful and convenient tool for a large variety of uses.

The auxiliaries consist of two sizes of caliper legs, two sizes of divider points (6 and 9 inch) which are eccentric for close settings, and a set of four ball points with holder. The ball points with holder are for scribing circles from the center of any hole up to 1½ inches in diameter. One of the large caliper legs is provided with a joint, operated by an eccentric thumb piece for fine adjustments. A lead pencil may be clamped in either head in place of the caliper legs or divider points.

The heads will accommodate any size beam from ¾ to 1½ inches in width. Due to the various lengths of beams required at different times and as it is a simple matter for the mechanic to arrange, we do not furnish a beam.

Cat. No.	EDP No.	Description
59A	50297	With One Pair Small 6" Divider Points
59F	50302	Set, Complete, as shown above
59B	50298	Ball Points with Holder only
59C	50299	Small Caliper Legs only (pair)
59D	50300	Large Caliper Legs only (pair)
59E	50301	Large 9" Divider Points only (pair)

No. 59A Sent Unless Otherwise Ordered—Packed One in a Box

Steel Beam Trammels

Bright Chrome Finish for Longer Life, Resistance to Corrosion

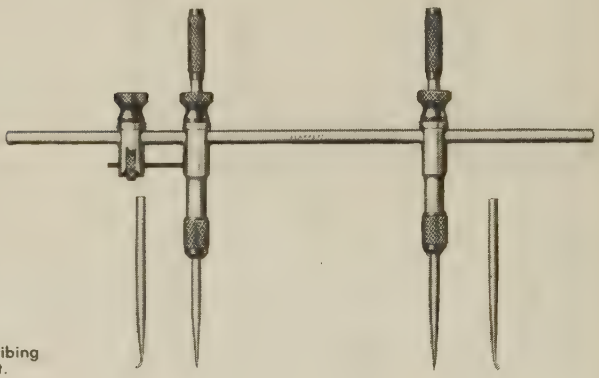
10½ to 20 Inch

No. C251 Series

★ **Designed for Draftsmen, Engineers, Metal Workers for Layout Work, Scribing and Measuring**

★ **Furnished with Rigid Steel Beam—10½, 14½ or 20" Sizes**

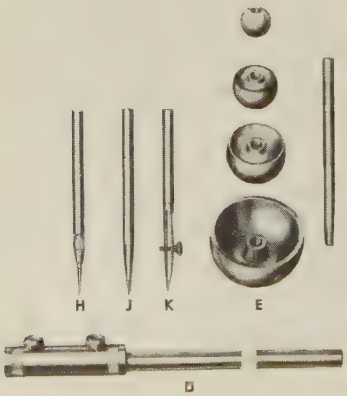
★ **Highly Versatile—Handy Attachments also Available**



No. C251A with 10½" beam for scribing 18" diameter circles shown at right.

A rigid, well designed trammel for layout, scribing and measuring. The top of the beam is flattened so that when the trams are clamped in position they will not turn from pressure on the points. The trams are held in place by spring friction which prevents them from sliding when the nuts are loosened for setting. One tram has an adjusting screw for fine adjustments of the points.

Each tram has a knurled swivel grip at the top which turns freely making it very convenient to swing the tool when scribing circles. The points may be adjusted for length in the spring chucks and can be easily replaced with caliper legs or other attachments listed below. The Ball Points permit working from holes up to 1½ inches in diameter. A pair of caliper points (F) is included with each trammel. Furnished with bright chrome finish.



Cat. No.	EDP No.	Size Beam	Scribe Circles, Diam.
C251A	51205	10½"	18"
C251B	51207	14½"	26"
C251C	51209	20"	36"
		ATTACHMENTS	
C251D	51211	Coupling, with extra 20" Beam (When used with No. C251C will scribe circle 72" diam.)	
C251E	51212	Ball Points and Holder	
C251F	51213	Extra Caliper Points, pair	
C251H	51214	Steel Point and Socket (one) (Has .076" hole diam. to hold leads)	
251J	51203	Needle Point (Chrome not available) (one)	
C251K	51215	Pen Attachment (one)	

No. C251A, B, C Available with Attractive, Protective Case; No. C251A Without Case Sent Unless Otherwise Ordered Packed One in a Box

Kleenscribe Layout Dye

A Blue Dye Specially Prepared for

- ★ Laying out dies, cams, templates, jigs, fixtures, patterns, castings.
- ★ Touching cutting tool to work before setting machine for cut.
- ★ Identifying tools, parts, bar stock and other shop metals.
- ★ Checking alignment of gears and wearing parts.

Kleenscribe is a deep blue dye for shop layout work, parts and stock identification, checking alignment of machine parts and setting cutting tools to workpiece. Brushed or sprayed onto a clean metal surface, it dries quickly, providing an opaque blue background that makes scribed lines stand out sharp and clear. Kleenscribe will not rub off on hands or clothing or flake away, nor is it affected by cutting lubricants and heat generated during machining. To use, be sure surface is clean, dry and free from grease and oil. Apply with handy brush in cap . . . or shake can thoroughly and spray thin, even coating at a distance of about 12" from the working surface, keeping the can in motion. To remove Kleenscribe, use rag or wiper moistened with denatured alcohol.

Cat. No.	EDP No.	Description
1610-4	53212	Layout Dye, in 4 fl. oz. cans
1610-16	53213	Layout Dye, in pint cans
1610-32	53214	Layout Dye, in quart cans
1611	55896	Layout Dye, in 11½ oz. pressure can

Packaging: 4 fl. oz. and Pint Cans Packed 12 in a Box; Quart Cans Packed 6 in a Box; 11½ oz. Pressure Cans Packed 12 in a Box

Tool and Instrument Oil

For Mechanics, Home-Owners, Sportsmen

STARRETT Tool and Instrument Oil is the same extra-fine lubricant made to our specifications and used in our factory to lubricate and protect STARRETT Mechanics' Hand Measuring Tools and Precision Instruments.

Because of many calls for the same fine oil we use on our tools, STARRETT Tool and Instrument Oil is now available to all mechanics, home owners, hobbyists and sportsmen requiring the finest all-purpose oil.

Especially desirable for fine instruments, micrometers and other tools, guns, fishing tackle, light machinery, home appliances and countless other applications listed below to insure maximum protection and lubrication of working parts.

Special high-refining makes STARRETT Tool and Instrument Oil colorless; insures thorough lubrication of close-fitting parts at high temperatures and below zero; and provides a strong *lasting* oil film over all areas requiring protection against rust. This oil has not been adulterated by additives for color and odor. Furnished in handy 3¼ fl. oz. cans.

USE Starrett Tool and Instrument Oil

★ **IN THE SHOP for maximum protection and lubrication of measuring tools, precision instruments and light machinery; to guard highly finished tools, parts, machine surfaces against rust.**

★ **AROUND THE HOME for lubricating sewing machines, vacuum cleaners, kitchen mixers, refrigerators, electric fans, bicycles, lawnmowers . . . for cleaning bright metals, polishing furniture.**

★ **ON RIFLES, SHOTGUNS, REVOLVERS, for maximum protection and to keep working parts in perfect condition. Also ideal for fishing tackle and other sporting equipment.**

★ **USE STARRETT OIL also for typewriters, adding machines, automobile generators, starters, hinges, locks, springs.**

Lubricating the slide on a No. 123 Vernier Caliper with Starrett Tool and Instrument Oil. Assures maximum protection and lubrication of working parts.

Cat. No.	EDP No.	Description
1620	53216	Tool and Instrument Oil, in 3¼ fl. oz. (0.096 liter) cans

Furnished in 3¼ fl. oz. Cans; Packed Twelve in a Box

M1® All Purpose Lubricant

2 oz aerosol

12 oz aerosol

Prevents rust and corrosion

M1 leaves a micro-thin, airtight coating that provides lasting protection.

Displaces moisture and wetness

M1 burrows under moisture, driving it to the surface where it will readily evaporate. A non-conductor, M1 can be sprayed on electrical equipment to prevent moisture-caused short circuits. Its residual thin film sheds moisture, protects surfaces for months (indoor or protected outdoor storage).

Lubricates and stops squeaks

M1 has instant lubricating properties that spread into hard-to-get-at places. As it dries, it leaves a thin protective film that stops squeaking, sticking, binding and provides continuing lubrication between mating parts.

Penetrates and frees rusted parts

M1 quickly penetrates deep-down to free frozen nuts, bolts and metal assemblies. Its residual dry-lube film protects against further corrosive action, keeps controls, linkages and mechanisms working freely.

Cleans and protects metal surfaces

M1's solvent action gets under and loosens caked grease, dried-on oil and similar shop soil. It cleans and prepares metal surfaces for more efficient M1 penetration, lubrication and rust protection.

Cat. and EDP No.	Description	Unit Pack Per Case
M1 93215	12 oz. aerosol with "magic wand" spray tube	12
M1 93409	2 oz. aerosol can	20 per carton 5 cartons per case

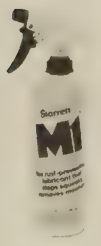
NEW HYDROCARBON PROPELLANT
M1 CONTAINS NO FLUOROCARBONS, NITRITES OR SILICONES

See next page for M1 specifications, bulk containers and bulk spray dispenser.

M1® All Purpose Lubricant
Continued

Bulk Containers and Dispenser

M-1 in large size containers makes the bulk buy the most economical way to treat metal surfaces. Brush it on. Wipe it on. Spray it on with handy bulk spray dispenser. Or fill dip tanks for treatment by immersion.



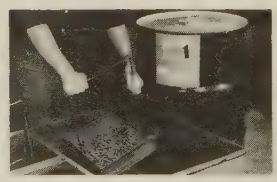
No. M-1.15

No. M-1.01 No. M-1.05 No. M-1.53

Cat. No.	EDP No.	Description	Unit Pack Per Case
M-1.01	93221	1 gal. container	4
M-1.05	93227	5 gal. pail with plastic pullout spout	1
M-1.53	93233	53 gal. drum	1
M-1.15	93251	1 pint bulk spray dispenser, empty, with trigger sprayer	4

M-1 protects working surfaces of machinery in part time use

Fill dip tanks with M-1 to protect production parts in process

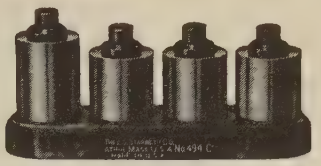


Dip cutting tools in M-1 when returning them to the crib

M1 Specifications

Color ..... amber (clear)
Odor ..... pleasant
Specific gravity ..... .788 @ 60°F (15.5°C)
Viscosity ..... 2.2 cSt (centiStokes) converts to 10.5 SUS (seconds universal Saybolt) at 72°F (22.2°C)
Lubrication ..... 1500 lbs of pressure (independent testing)
Flash point .... min 127°F (53°C) T.O.C. (Toledo open cup)
Percent non-volatile ..... 15% by weight
Percent volatile, max... 85% by weight petroleum distillate
Pour point —100°F (—73°C) ..... excellent low temperature stability
Evaporation rate ..... .7 (water = 1)
Coverage ..... 3500 to 4000 sq ft per U.S. gal
Boiling point, initial ..... 343°F (173°C)
Weight, applied coating ..... 1.7 x 10^{-3} lbs per sq ft
Film thickness ..... .0004" (0.010 mm) average
Dielectric strength.... 18,000 v with .100" (2.54 mm) gap
Military specifications .. MIL-C-23411-A and MIL-C-16173-D Grade 3
FDA specification...a food safe lubricant for food machinery such as rollers, belts, slides and other equipment in close proximity to foods, acceptable under Food and Drug Administration and federal regulation title 21 revised one (April, 1976) sub-part F lubricants, paragraph 121.2553.
Humidity ..... meets and exceeds ASTM-D655 zero rust after 1000 hours
Salt spray ..... meets and exceeds ASTM-B117 zero rust after 48 hours
Indoor protection lasts up to a year.
Outdoor protection — re-apply as needed.
Note: most plastics, rubber and painted materials show no visible effects when coated with M1

Toolmakers' Buttons No. 494



STARRETT Toolmakers' Buttons are hardened and ground and lapped to size. The ends are ground square with the sides to assure perfect alignment with the work.

Each set consists of four buttons of the same diameter which are fastened to a steel base plate to protect the screws and washers that are used in clamping them to the work. One button in each set is ⅛ inch longer than the others to facilitate truing up when two buttons are used closely together. The longer one is ⅝-inch long and the other three are ½-inch.

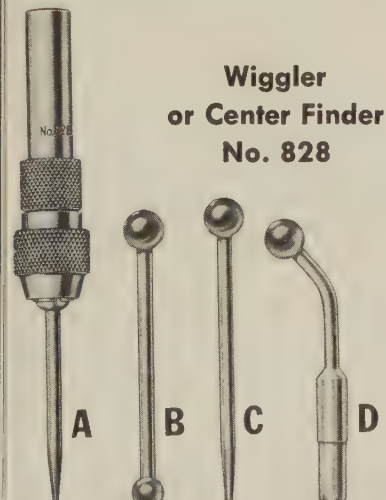
The A, B, and C sets of buttons measure .300, .400 and .500 of an inch respectively. The holes in the buttons are larger than the screws to permit sidewise adjustment after preliminary fastening to the work.

Cat. No.	EDP No.	No. Buttons per Set	Dia. Buttons	Length Long Button	Length Other 3 Buttons
494A*	52535	4	.300″	⅝″	½″
494B*	52536	4	.400″	⅝″	½″
494C*	52537	4	.500″	⅝″	½″

*NOTE: Furnished in complete sets of 4 buttons with screws, washers and base plate. Screw threads are standard No. 5-40.

Packed One Set in a Box

Wiggler or Center Finder No. 828



Furnished with an offset indicator holder and a new chuck to hold all attachments. Four different attachments adapt the tool to countless applications and are readily interchangeable in the wiggler shank. The attachments are snapped in the chuck without removing the collet nut and are clamped by a ball swivel joint which permits adjustment to an angular position or true concentricity.

Using offset indicator holder D with Starrett Last Word Test Indicators, the mechanic can sweep holes or O.D.'s for checking run-out or concentricity; establish center distances; check straightness or alignment of flat surfaces.

With point A, working centers can be quickly and accurately located. Spring tension on the ball of the point permits guiding the point to true concentricity so that the work can be brought into perfect alignment with the machine spindle.

Ball contact B is useful in locating work by first bringing the contact, ball diameter .250″, against the work, a slot, hole, shoulder, end and indexing the work to the desired position relative to the spindle.

Contact C, which has a small disc at the end .100″ diameter, permits use in more confined areas such as slots, shallow holes.

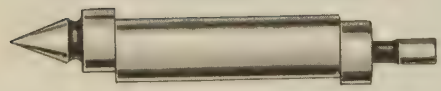
Cat. No.	EDP No.		Length Closed	Length Open	Shank Diameter
S828HZ	53064	Center Finder, Complete with Case and 4 Attachments A, B, C, D			
S828	53065	Center Finder, without Indicator Holder, without Case			
828A	53066	Shank with Point	2⅛″	4⅛″	¾″
828B	53067	Ball Contact Only (.250″ ball)			
828C	53068	Disc Contact Only (.100″ disc)			
828D	53069	Offset Indicator Holder Only			

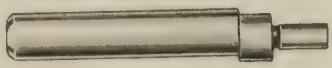
No. S828HZ Complete with Case Sent Unless Otherwise Ordered. Packed One in a Box; Complete or Individual Parts.

Edge Finders

For Fast, Accurate Work Location
.375", .500" and 10 mm (Metric) Body Diameters

No. 827 Series
No. 827MA (Metric)





Work surfaces may be located easily, quickly and accurately with the new Starrett No. 827 Edge Finder. Work with flat straight edges, shoulders, grooves, round work, studs, dowels, or center points and scribed lines—all can be accurately located with this handy tool.

Available in two sizes. No. 827A has a .375" diam. body and .200" diam. contact; No. 827B has .500" diam. body and .200" diam. contact plus a pointed contact at opposite end for locating center points and scribed lines. Body and contacts are made of tool steel, hardened, ground and lapped to close tolerances for diameter and concentricity.

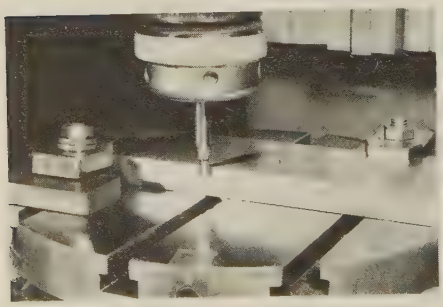
Easy to use. Edge finder is placed in collet or chuck. Work table is then traversed to obtain contact between rotating edge finder and work. Contact will shift to a concentric position relative to the body and with very slight additional table adjustment will move off center with a decided wobble. At this point, the center of the finder is exactly one-half the diameter of the contact from the work edge permitting accurate location for other machining operations relative to the edge.

For locating center points and scribed lines the pointed contact is used using a pencil or rule against the center point and making it run concentrically. Then the point is brought down to the center point or intersection of scribed lines and the table adjusted so that when the tool is brought to barely touch the work, the lineup with the point in question can be ascertained.

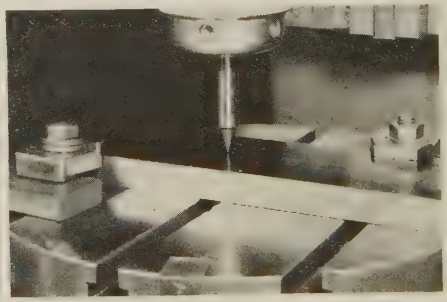
Cat. No.	EDP No.	Description	Body Diameter	Contact Diameter
827A	53062	Single End	.375"	.200"
827B	53063	Double End	.500"	.200" and pointed contact
827MA	56041	Single End	10 mm	6 mm

Furnished in attractive, protective case

Packed One in a Box



No. 827A locating work from straight edge.



Locating work from scribed line with No. 827B.

Toolmakers' Surface Gages

Hardened Steel Base

4 and 7 Inch

No. 56 Series

THE STARRETT No. 56 Toolmakers' Surface Gages are especially designed for light work and have all the latest improvements of the larger and heavier models described on the following pages.

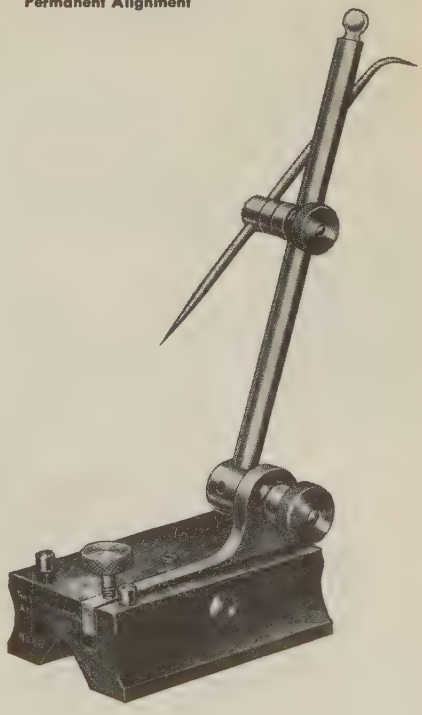
The base is made of steel, nicely finished, and hardened. All contact faces are ground and polished, and there is a depression in each side of the base for the thumb and fingers. A groove in the base adapts it for use on cylindrical as well as flat surfaces. The front end of the base is also grooved so that the spindle which passes through the rotating head or lower sleeve can be set above or below the base. This feature permits the scriber to be used either above or below the base as a depth gage as well as a height gage. There are two gage pins in the base, frictionally held, which can be pushed down and used against the edge of a surface plate or a T-slot for linear work.

For small work the scriber may be clamped in the small hole of the lower sleeve in place of the spindle. The upper and lower sleeves are designed so that the scriber and spindle holes are always in alignment.

The fine adjustment feature makes it possible to obtain quick and accurate settings. This adjustment is made by a knurled thumb screw which is located at the end of the base rocker. The rocker runs the entire length of the base and pivots against a stiff spring located at the front end allowing a wide range of adjustment.

The tool weighs but ten ounces and takes very little space in the tool box as the base is only 1 9/16 inches wide, 2 1/8 inches long and 1 3/8 inches high including lower sleeve.

- ★ **Small Compact Size, Ideal for Light Work**
- ★ **Hardened Steel Base, Ground and Polished**
- ★ **Two Gage Pins in Base for Linear Work**
- ★ **V-Groove in Base for Cylindrical Work**
- ★ **Spindle Adjustable to Any Angle Above or Below Base**
- ★ **Extra Fine Adjustment Plus Wide Range**
- ★ **Scriber and Spindle Holes in Permanent Alignment**



Cat. No.	EDP No.	Spindle	Base
56A	50289	4″	2 1/8″x1 9/16″
56B	50290 (two)	4″ and 7″	2 1/8″x1 9/16″
56C	50291	7″	2 1/8″x1 9/16″

NOTE: Length of Spindles Does Not Include Base

Packed One in a Box

The No. 56A Surface Gage with 4 inch spindle is shown above. This gage, like all Starrett Surface Gages, is one of the most useful tools in the mechanic's kit, and is used in layout work for scribing lines on vertical or horizontal surfaces. Also useful in inspection work as a height gage or depth gage.

Universal Surface Gages

Cast Base

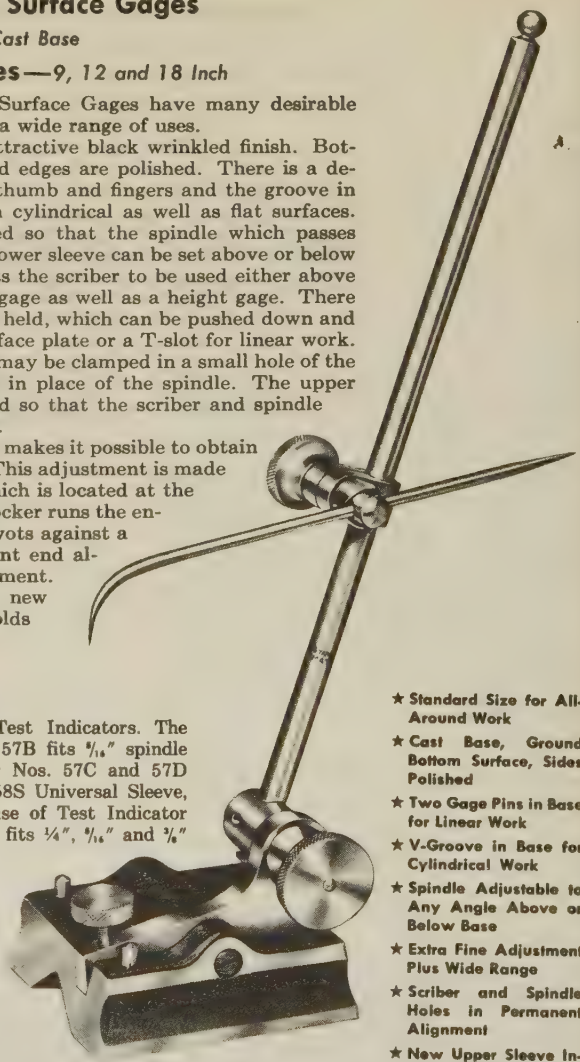
No. 57 Series—*9, 12 and 18 Inch*

STARRETT No. 57 Universal Surface Gages have many desirable features and are designed for a wide range of uses.

The base is cast and has attractive black wrinkled finish. Bottom of the base is ground and edges are polished. There is a depression in each side for the thumb and fingers and the groove in the base adapts it for use on cylindrical as well as flat surfaces. The front end is also grooved so that the spindle which passes through the rotating head or lower sleeve can be set above or below the base. This feature permits the scriber to be used either above or below the base as a depth gage as well as a height gage. There are two gage pins, frictionally held, which can be pushed down and used against the edge of a surface plate or a T-slot for linear work.

For small work, the scriber may be clamped in a small hole of the lower sleeve or rotating head in place of the spindle. The upper and lower sleeves are designed so that the scriber and spindle holes are always in alignment.

The fine adjustment feature makes it possible to obtain quick and accurate settings. This adjustment is made by a knurled thumb screw which is located at the end of the base rocker. The rocker runs the entire length of the base and pivots against a stiff spring located at the front end allowing a wide range of adjustment. No. 57 Surface Gages have a new style upper sleeve that holds scribers and rods of various indicators ranging from .140″ to .250″ diameter. This feature permits use of Nos. 196, 645, 711 and 564 Test Indicators. The upper sleeve for Nos. 57A and 57B fits $^{5}/_{16}$″ spindle diameters; the upper sleeve for Nos. 57C and 57D fits $^{3}/_{8}$″ spindle diameters. No. 58S Universal Sleeve, page after next, also permits use of Test Indicator Nos. 196, 645, 711 and 564 and fits ¼″, $^{5}/_{16}$″ and $^{3}/_{8}$″ spindles.



- ★ Standard Size for All-Around Work
- ★ Cast Base, Ground Bottom Surface, Sides Polished
- ★ Two Gage Pins in Base for Linear Work
- ★ V-Groove in Base for Cylindrical Work
- ★ Spindle Adjustable to Any Angle Above or Below Base
- ★ Extra Fine Adjustment Plus Wide Range
- ★ Scriber and Spindle Holes in Permanent Alignment
- ★ New Upper Sleeve Increases Versatility

Cat. No.	EDP No.		Spindle	Base
57A	50292		9″	$2^{15}/_{16}$″x$2^{9}/_{16}$″
57B	50293	(two)	9″ and 12″	$2^{15}/_{16}$″x$2^{9}/_{16}$″
57C	50294		12″	$3^{1}/_{16}$″x$3^{1}/_{16}$″
57D	50295	(two)	12″ and 18″	$3^{1}/_{16}$″x$3^{1}/_{16}$″

NOTE: Length of Spindles Does Not Include Base

Packed One in a Box

Machinists who want a larger surface gage than the No. 56 will find the No. 57 ideal. The No. 57A with 9 inch spindle illustrated at left.

Universal Surface Gages

Hardened Steel Base

No. 257 Series—*9, 12 and 18 Inch*

★ **Standard Size—Ideal for All-Around Work**
★ **Hardened Steel Base, Ground and Polished Contact Faces**
★ **Four Gage Pins in Base for Linear Work**
★ **V-Groove in Base for Cylindrical Work**
★ **Spindle Adjustable to Any Angle Above or Below Base**
★ **Extra Fine Adjustment Plus Wide Range**
★ **Scriber and Spindle Holes in Permanent Alignment**
★ **New Upper Sleeve Increases Versatility**

STARRETT No. 257 Surface Gages have all the latest improvements, and are exceptionally well finished and of sturdy construction.

The base is made of steel, nicely finished, and hardened. All contact faces are ground and polished, and there is a depression in each side of the base for the thumb and fingers. A groove in the base adapts it for use on cylindrical as well as flat surfaces. The front end of the base is also grooved so that the spindle which passes through the rotating head or lower sleeve can be set above or below the base. This feature permits the scriber to be used either above or below the base as a depth gage as well as a height gage. There are four gage pins in the base, frictionally held, which can be pushed down and used against the edge of a surface plate or a T-slot for linear work.

For small work the scriber may be clamped in the small hole of the lower sleeve or rotating head in place of the spindle. The upper and lower sleeves are designed so that the scriber and spindle holes are always in alignment.

The fine adjustment feature makes it possible to obtain quick and accurate settings. This adjustment is made by a knurled thumb screw which is located at the end of the base rocker. The rocker runs the entire length of the base and pivots against a stiff spring located at the front end allowing a wide range of adjustment.

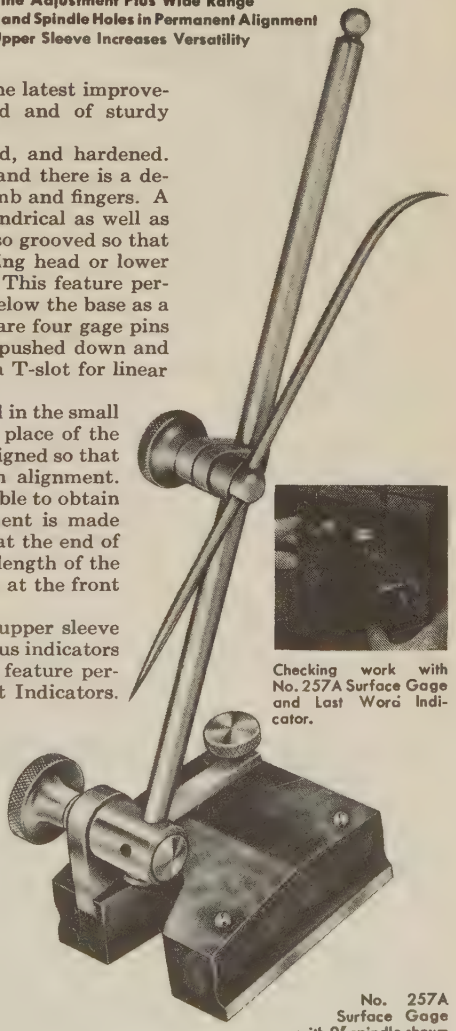
No. 257 Surface Gages have a new style upper sleeve that holds scribers and rods or stems of various indicators ranging from .140″ to .250″ diameter. This feature permits use of Nos. 196, 645, 711 and 564 Test Indicators. The upper sleeve for Nos. 257A and 257B fits 5/16″ spindle diameters; the upper sleeve for Nos. 257C and 257D fits 3/8″ spindle diameters. No. 58S Universal Sleeve, next page, also permits use of Test Indicator Nos. 196, 645, 711 and 564 and fits 1/4″, 5/16″ and 3/8″ spindles.

Cat. No.	EDP No.	Spindle	Base
257A	51240	9″	2 5/16″ x 2 1/4″
257B	51241	(two) 9″ and 12″	2 5/16″ x 2 1/2″
257C	51242	12″	3 1/2″ x 3 5/16″
257D	51243	(two) 12″ and 18″	3 1/2″ x 3 5/16″

NOTE: Length of Spindles Does Not Include Base

Packed One in a Box

Checking work with No. 257A Surface Gage and Last Word Indicator.

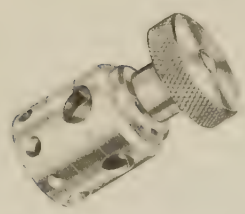


No. 257A Surface Gage with 9″ spindle shown here. Also available with 12 and 18 inch spindles as listed left.

Universal Sleeves

Adapts Indicators or Scribers to Surface Gages and Other Tools

Nos. 57S and 58S

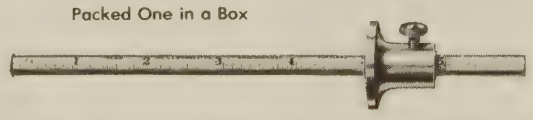


Nos. 57S and 58S Universal Sleeves provide a convenient means of attaching scribers and indicator shanks to surface gages, 657 series magnetic bases, indicator tool post holders and gage rods. The large diameter knurled clamping nut provides a firm grip on rods, posts and scribers.

Cat. No.	EDP No.	Spindle Hole Diameters	Gripping Hole Diameters
57S	50296	5/16", 3/8"	1/4", 3/16", 5/32", 9/64"
58S	56613	1/4", 5/16", 3/8"	.140" to .250"

Packed One in a Box

Scratch Gages No. 29



THE STARRETT No. 29 Scratch Gage is an extremely useful tool for scribing lines parallel to a given surface. It is made of steel and the head is hardened. The gage is securely locked by a knurled clamp screw and split bushing in the head. The marker is a square piece of thin tempered steel firmly held against the edge of the beam by a screw. The graduated beam is graduated the full 6 inches by 64ths of an inch, and fine adjustments may be made by a slight rotating movement of the head.

Cat. No.	EDP No.	Size Beam	Graduation
29A	50200	6"	Plain
29B	50201	6"	64ths

No. 29B Graduated Gage Sent Unless Otherwise Ordered. Two Extra Cutters Sent With Each Gage Packed One in a Box

Pocket Scribers—No. 70

With Tungsten Carbide or Regular Point

The handle is steel tubing, knurled and nickel plated. The scriber point is steel, properly tempered. It is held firmly in the handle by a knurled chuck and when not in use can be reversed, telescoped into the handle and locked by a slight turn of the chuck. The hexagon head prevents rolling. Also available with tungsten carbide point.

Cat. No.	EDP No.	Point	Handle Dia.	Point Length
70A	50323	Steel	1/4"	2 3/8"
70B	50324	Steel	3/8"	2 7/8"
*2355A	70332	Steel	Point Only For No. 70A	
*2355B	70333	Steel	Point Only For No. 70B	
70AX	50327	Carbide	1/4"	2 3/8"
70BX	56092	Carbide	3/8"	2 7/8"
*14398	71527	Carbide	Point Only For No. 70AX	
*19306	72049	Carbide	Point Only For No. 70BX	

*Part Number

Packed Six in a Box

NOTE: Blades of No. 553 Screw Drivers (see index) will fit handles of No. 70 Scribers. In ordering, specify A or B size. See price list.

Packed Six in a Box

No. 67 Improved Scriber

Points are steel, properly tempered, and well finished. The handle, as well as the points, has a knurled grip. The long bent point is handy for reaching through holes. The length of the scriber with the short bent point is 9 inches and with the long bent point, 12 inches. The points screw into the handle and fit either end. The knurled handle is nickel plated.

Cat. No.	EDP No.	Description
67A	50316	Complete with 3 Points (1 straight, 1 short bent, 1 long bent)
67B	50317	With 2 Points (1 straight, 1 short bent)
*16584	71555	Extra Straight Point
*16585	71556	Extra Short Bent Point
*16586	71557	Extra Long Bent Point

*Part No.

No. 67 Complete with 3 Points Sent Unless Otherwise Ordered
Packed One in an Envelope; Six in a Box

Adjustable Sleeve Scriber

No. 68

A VERY handy scriber with a point 8 inches in length which is held by an adjustable knurled sleeve. The adjustable sleeve may be clamped near to or away from the working point. The sleeve is nickel plated.

Cat. No.	EDP No.	Description
68A	50322	With Knife Point
68B	50321	Without Knife Point

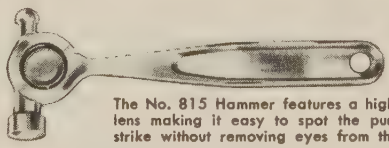
Packed One in an Envelope; Six in a Box

Toolmakers' Hammer

With Built-In Magnifying Lens

No. 815

Available Personalized with Your Name



The No. 815 Hammer features a high power lens making it easy to spot the punch and strike without removing eyes from the work.

Faster, easier, and more accurate spotting and punching of center lines and intersections is now possible with the new Starrett Hammer for tool makers and die makers.

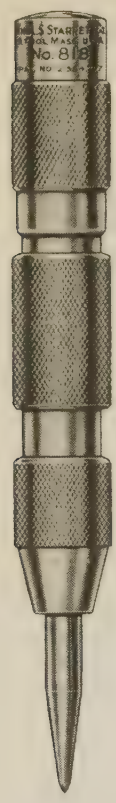
A magnifying lens built into the head of the hammer eliminates the usual fumbling and looking away involved when a separate glass and hammer are used. High-power magnification makes it easy to spot the punch and strike without once removing the eyes from the work.

The hammer is light—weighing only four ounces—but is made of a steel forging for strength and rigidity. Highly attractive chromium finish. Both flat and ball peen heads are provided which are offset for use in corners or close to obstructions. The lens is mounted in rubber for shock resistance.

The No. 815 Hammer can also be personalized with your name or the name of a friend at slight additional cost. Maximum 17 letters and spaces total.

Cat. No.	EDP No.	Description
815	53041	With Built-In Magnifying Lens
815P	—	Personalized - With Built-In Magnifying Lens

Packed One in a Box



Automatic Center Punch

With Adjustable Stroke

No. 818

NEW LIGHTWEIGHT ALUMINUM HANDLE FOR POSITIVE GRIP, EASY HANDLING

No Hammer Needed—Just Sight, Then Strike. Perfect Indentation Every Time.

NEW Starrett No. 818 Automatic Center Punch features a lightweight aluminum handle for effortless handling plus three diamond knurled bands for strong comfortable gripping.

No hammer required! All you do is hold punch in an upright position, press handle down, and built-in mechanism strikes a perfect center mark every time.

The force of the blow is regulated by turning the knurled cap. Screw cap down to increase blow required for striking heavy indentation. Progressively lighter indentations are obtained by screwing the cap upward. Once the knurled cap is set to desired position, the center punch will strike the same depth every time.

All working parts are tool steel, properly hardened. Hardened tool steel point may easily be removed for resharpening or replacement.

Cat. No.	EDP No.	Length	Diameter
818	53048	5"	3/8"

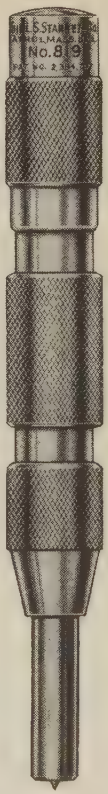
Packed One in a Box

. . . sure grip, lightweight, positive action. For easy one-hand precision center punching of metals; plastics, woods and any other machineable material.

Automatic Centering Punch

With Adjustable Stroke

No. 819



ALL THE FEATURES OF No. 818 PLUS PRECISION BEVELED LOCATING SLEEVE FOR CENTERING COUNTERSUNK HOLES

The Tool That Carpenters, Cabinet Makers, Metal Workers, and Home Craftsmen Have Been Waiting For.

HERE'S the brand new Starrett Automatic Centering Punch that combines the same new lightweight aluminum handle and easy one-hand operation of No. 818 with an exclusive self-centering locating sleeve.

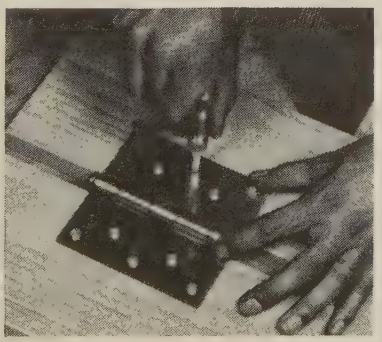
The locating sleeve automatically centers starting holes for screws through butt hinges and all other types of builders' and cabinet hardware items . . . leaving one hand completely free for holding and steadying. Also ideal for centering countersunk holes.

Engage beveled edge of sleeve with countersunk hole in hinge. Press down on handle until built-in mechanism strikes blow. By this simple process you obtain truly concentric starting holes every time without risk of drilling off-center and causing screws to pull hinges or builders' hardware off-center. To draw hinges, etc., sideways, tilt punch slightly in opposite direction.

No. 819 can be adjusted for striking light or heavy impressions by turning knurled cap, and point removes easily for resharpening.

Cat. No.	EDP No.	Length	Diameter
819	53049	5"	5/16"

Packed One in a Box



. . . automatically locates and centers countersunk holes and starting holes for screws, through hinges, latches, catches, etc. Also ideal for general purpose center punching of metals, plastics etc.

Automatic Center Punches

With Adjustable Stroke

No. 18 Series

Starrett No. 18 Center Punches are highly useful for fast accurate marking of all fine work. These punches contain a mechanism which automatically strikes a blow when downward pressure is applied. No hammer is required, and one hand is therefore always free to steady the work. Simply hold the punch in an upright position, apply downward pressure to release the striking block, and the proper impression is accurately placed without slipping.

The force of the blow is regulated by the adjustable knurled cap. Should a heavy mark be required, the cap is screwed down. Progressively lighter marks are obtained by turning the cap upward. The tension of the spring which regulates the blow is constant so that marks made by the point are uniform in depth and size for each setting. All working parts are properly hardened. The point can be easily removed for regrinding and replacement. All sizes are identical in style and differ only in the striking power. The heavy-duty C size is capable of striking a much heavier blow than the other sizes and has a one-piece point and shank which may easily be resharpened or replaced.

Cat. No.	EDP No.	Length	Diameter
18AA	50119	$3^{33}/_{64}$"	$^{7}/_{16}$"
18A	50120	$4^{13}/_{16}$"	$^{9}/_{16}$"
18B	50121	$5^{5}/_{32}$"	$^{11}/_{16}$"
18C	56757	$5^{5}/_{32}$"	$^{11}/_{16}$"
*2947	70380	Point Only for Nos. 18AA, 18A	
*2948	70381	Point Only for No. 18B	

*Part Number

NOTE: Special Points for stamping numbers, letters, special symbols, etc. can be furnished. Write our Special Order Dept.

No. 18A Sent Unless Otherwise Ordered
Packed One in a Box

Spacing Attachment for Automatic Center Punches

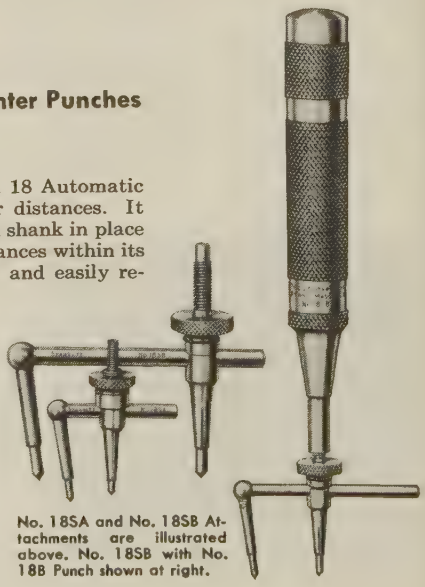
No. 18S Series

THIS handy Attachment is used with our No. 18 Automatic Center Punches for accurately spacing center distances. It can be instantly screwed into the No. 18 Punch shank in place of the regular point, and it quickly spaces distances within its range. The locating point is frictionally held and easily replaced. The A size has a range of $^{1}/_{16}$ to $^{3}/_{4}$ inch and fits either the No. 18AA or 18A Center Punch. The B size has a range of $^{1}/_{8}$ to $1^{3}/_{4}$ inches and fits the No. 18B Center Punch.

Cat. No.	EDP No.		Range
18SA	50125	Fits No. 18AA and No. 18A Center Punch	$^{1}/_{16}$"-$^{1}/_{4}$"
18SB	50126	Fits No. 18B Center Punch	$^{1}/_{8}$"-$1^{1}/_{4}$"

Extra Points only (Specify SA or SB size)

Packed One in a Box



No. 18SA and No. 18SB Attachments are illustrated above. No. 18SB with No. 18B Punch shown at right.

Center Punches

Round Shank—Knurled Grip

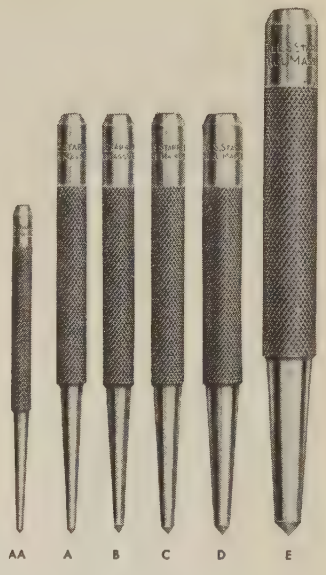
No. 117 Series—*3⅛ to 5 Inch*

STARRETT No. 117 Center Punches are made of a fine tool steel specially selected for this type of a tool. They are hardened on both ends. A special tempering process prevents the head from fracturing. This feature adds greatly to the life of the punch and also avoids accidents from flying splinters. They are well proportioned, highly finished and have a knurled finger grip. The points are ground at the proper angle to give maximum service, and the tips are accurately centered.

Cat. No.	EDP No.	Length	Diam. at Top of Tapered Point	Diam. of Body
117AA	50482	3⅛"	1/16"	3/16"
117A	50483	4"	5/64"	9/32"
117B	50484	4"	3/32"	19/64"
117C	50485	4"	9/64"	5/16"
117D	50486	4"	5/32"	3/8"
117E	50487	5"	1/4"	1/2"
S117PC	50488	Set of Five AA, A, B, C, D in Case		
S117PB	57076	Set of Six AA, A, B, C, D, E in Plain Box		

No. S117PC Set of Five in Attractive, Protective Case Sent Unless Otherwise Ordered

Packed: No. 117AA, A, B, C, D Twelve in a Box
No. 117E Six in a Box



Center Punches

No. 264 Series—*2⅞ to 5 Inch*

THESE Center Punches have a square knurled grip and will not roll when laid down. They are made of tool steel hardened and tempered their full length. A special tempering process prevents the head from fracturing. The tips are accurately centered and ground at the proper angle to give maximum service.

Cat. No.	EDP No.	Length	Diam. at Top of Tapered Point	Thickness of Square Body
264A	51278	2⅞"	1/16"	1/4"
264B	51279	3⅞"	5/64"	1/4"
264C	51280	3 11/16"	3/32"	1/4"
264D	51281	4"	1/8"	23/64"
264E	51282	4⅛"	5/32"	23/64"
264F	51283	4⅜"	3/16"	27/64"
264G	51284	5"	1/4"	27/64"
S264WB	51285	Set of Seven A, B, C, D, E, F, G in Round Wood Box		

No. S264WB Set of Seven in Round Wood Box Sent Unless Otherwise Ordered

Packed: No. 264A, B, C, D, E, F Twelve in a Box
No. 264G Six in a Box

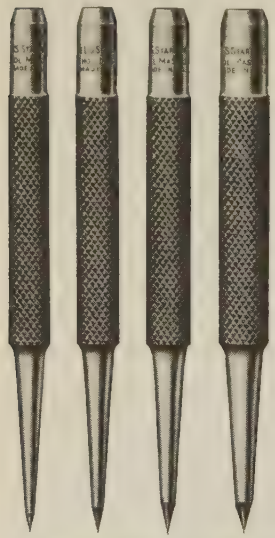
Spacing Center Punch

No. 118—*4 Inch*

THE STARRETT No. 118 Combination Center Punch and Spacing Tool is handy for quick, accurate layout of work for drilling. The punch is solid and made from specially selected tool steel properly hardened. The guide point is set in a socket, and a spiral spring holds it in position. When the punch is struck, the guide point is forced into the socket against spring pressure. This feature permits the punch to be held perpendicular to the work and assures accurate spacing. A knurled screw which works against a pin plunger adjusts the spring arm that holds the guide point. The spacing adjustment ranges from approximately 5/64-inch to 3/8-inch.

Cat. No.	EDP No.	Spacing Range
118	50490	5/64" — 3/8"

Packed Three in a Box



Prick Punches

Round Shank—Knurled Grip

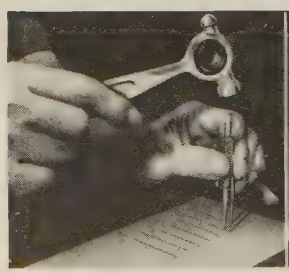
4 Inch

No. 816 Series

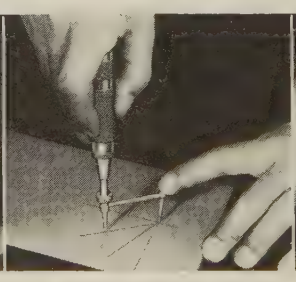
THE points of No. 816 Prick Punches are carefully ground to the correct taper to give sharp impressions and long point life. These punches are made from specially selected tool steel properly hardened. The shank and head are highly polished.

Cat. No.	EDP No.	Length	Diam. at Top of Tapered Point	Diameter of Body
816A	53043	4"	5/64"	7/32"
816B	53044	4"	3/32"	19/64"
816C	53045	4"	7/64"	5/16"
816D	53046	4"	5/32"	3/8"
S816PC	57078	Combination set in plastic case. One each #816A, B, C, D prick punches and one #117AA center punch.		

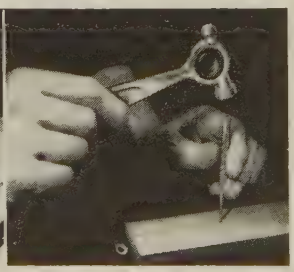
#816A, B, C, D Packed Twelve in a Box



No. 118 Spacing Center Punch is used with No. 815 Toolmakers Hammer to locate centers for a series of equally spaced holes.



Locating equidistant centers with No. 188 Automatic Center Punch and No. 18SB Spacing Attachment.



No. 816A Prick Punch is used with No. 815 Toolmakers Hammer to locate hole centers on this workpiece.

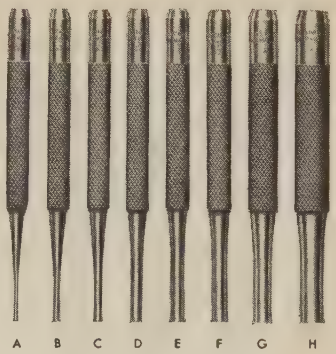
Drive Pin Punches

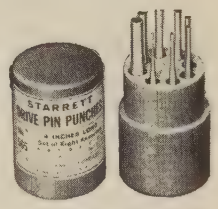
No. 565 Series—*4 Inch*

STARRETT No. 565 Drive Pin Punches are made from a specially selected tool steel. They are well proportioned, hardened, highly polished and have a knurled finger grip. The size of the punch is stamped on the head of each set.

Cat. No.	EDP No.	Length	Diam. Punch	Diam. Body
565A	52578	4″	1/16″	19/64″
565B	52579	4″	3/32″	19/64″
565C	52580	4″	1/8″	19/64″
565D	52581	4″	5/32″	19/64″
565E	52582	4″	3/16″	5/16″
565F	52583	4″	7/32″	25/64″
565G	52584	4″	1/4″	25/64″
565H	52585	4″	5/16″	29/64″
S565WB	52586	Set of Eight Drive Pin Punches (1 of each size) in Round Wood Box		
S565PC	52587	Set of Eight Drive Pin Punches (1 of each size) in Attractive, Protective Case		

Packed No. 565 A, B, C, D, E, F, G, 12 in a Box;
No. 565H, 6 in a Box; No. S565 Set, One Set in a Box
No. S565WB Sent Unless Otherwise Ordered





No. S565WB Set of Eight in round wood box.

Drive Pin Punches

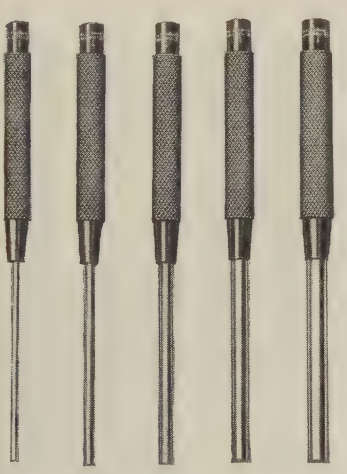
For Motor Service and Machine Shop Work

No. 248 Series—*8 Inch*

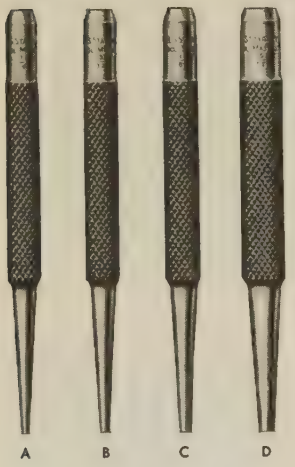
STARRETT No. 248 Drive Pin Punches are extra long, measuring 8 inches long. The bodies are 4½ inches and the drive pin sections are 3½ inches long. They are made from specially selected tool steel, are well proportioned, hardened and have a knurled grip. They are designed to stand hard use and provide a most satisfactory punch for machine shop and motor service work. Just the punch to follow long cotter pins and the like into a hole without hindrance. The diameters of the punches are slightly minus the sizes shown below.

Cat. No.	EDP No.	Length	Diam. Punch	Diam. Body
248A	51181	8″	1/8″	7/16″
248B	51182	8″	3/16″	1/2″
248C	51183	8″	1/4″	1/2″
248D	51184	8″	5/16″	1/2″
248E	51185	8″	3/8″	9/16″
S248PC	51186	Set of Five Drive Pin Punches (1 of each size) in Attractive, Protective Case		
S248	51187	Set of Five Drive Pin Punches (1 of each size) in Plain Box		

Packed Individual Sizes 6 in a Box;
One Set in a Box
No. S248PC Sent Unless Otherwise Ordered



Starrett No. 248 Drive Pin Punches available in 5 different sizes as shown above. Also available as a set in attractive, protective case.



Nail Sets
No. 116 Series

No. 116 Nail Sets are made of selected tool steel, highly polished, with end beveled to prevent breakage, and hardened and tempered for longer life. Proportioned for strength and nice balance, they feature oval shaped head surface for easier striking, cupped punch surface for non-slip nail contact, and sure-grip knurling for positive holding. The punch diameter of each set is clearly marked on the head.

Cat. No.	EDP No.	Length	Punch Diam.	Body Diam.
116A	50477	4″	1/16″	17/64″
116B	50478	4″	5/32″	19/64″
116C	50479	4″	1/8″	9/16″
116D	50480	4″	9/32″	23/64″
S116PB	56642	Dozen Assorted in Plain Box consisting of 3 ea. A, B, C & D		

Packed Twelve in a Box

Square Head Nail Sets
No. 800 Series

No. 800 Nail Sets feature a round knurled grip and a large square head that provides a large striking surface, prevents rolling, and makes them easy to pick out from nails and other tools in the pocket.

Made from special tool steel, polished, with end beveled to prevent breakage and hardened and tempered for longer life. The punch surface is cupped to follow the nail without sliding off, and the punch diameter of each set is clearly marked on the head.

Cat. No.	EDP No.	Length	Punch Diam.	Body Diam.
800A	53029	4″	1/32″	11/32″
800B	53030	4″	1/16″	11/32″
800C	53031	4″	3/32″	11/32″
800D	53032	4″	1/8″	11/32″
800E	53033	4″	5/32″	11/32″
S800RWB	57077	Set of 5 in round wooden box. One each of #800A, B, C, D, E.		

#800A, B, C, D, E Packed Twelve in a Box

Hold Downs

4 to 6 Inch

No. 54 Series

Starrett No. 54 Hold Downs furnished in matched pairs as listed below.

STARRETT Hold Downs are of improved design to firmly hold work flat on a machine bed or in a vise. They are particularly useful for holding small work or thin materials without distortion.

The contact edges are tapered to hold the work securely and to force it downward to the bed of the machine or against any parallel surface.

The hold downs are made of tool steel, hardened and ground.

The A, B, and C sizes are of the same width and thickness so that the various lengths may be used together.

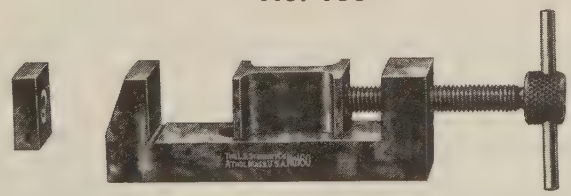
Cat. No.	EDP No.	Length	Width
54A (pair)	50274	4″	$^{27}/_{32}$″
54B (pair)	50275	5″	$^{27}/_{32}$″
54C (pair)	50276	6″	$^{27}/_{32}$″

Packed One Pair in a Box

Toolmakers' Steel Clamps

2 Inch

No. 160



Starrett No. 160 Toolmakers' Clamps are furnished in pairs consisting of two clamps shown singly at the left.

These clamps are useful in layout work or for holding work securely in drilling and other such operations. Each clamp is furnished with two take-up blocks that slip on the end of the screw. The blocks are held in such a manner so as to allow a slight swivel action which conforms the angle of the block to the shape of the work being held. There is a hole in the base of the clamps so that they may be fastened to the bench and used as a small vise. Using the small take-up block each clamp has a clamping capacity of two inches. Clamps are made of steel, case-hardened and are smoothly finished.

Cat. No.	EDP No.	Capacity
160 (pair)	50592	2″

Packed One Pair in a Box

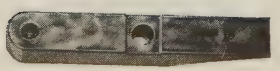
Toolmakers' Parallel Clamps

¾ to 3½ Inch

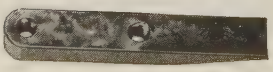
No. 161 Series

STARRETT No. 161 Toolmakers' Parallel Clamps are designed for maximum strength and rigidity. Extremely useful for holding work together in tapping and drilling and on various machine setups. The ends of the jaws are rounded to permit clamping under shoulders or in recesses. A retaining ring holds the loose jaw in alignment when the clamp is being opened or closed. The clamps are made of steel, nicely finished and case-hardened.

Starrett No. 161 Clamps are furnished in pairs as illustrated. The retaining ring feature holds the loose jaw in constant alignment.



No. 2



No. 1

Cat. No.		EDP No.	Clamping Capacity	Length of Jaws
161AA	(pair)	50593	¾″	1⅝″
161A	(pair)	50594	1¼″	2″
161B	(pair)	50595	1¾″	2½″
161C	(pair)	50596	2¼″	3″
161D	(pair)	50597	2¾″	4″
161E	(pair)	50598	3½″	5″

NOTE: For Duplicate Parts write for Duplicate Parts Booklet No. 115V.

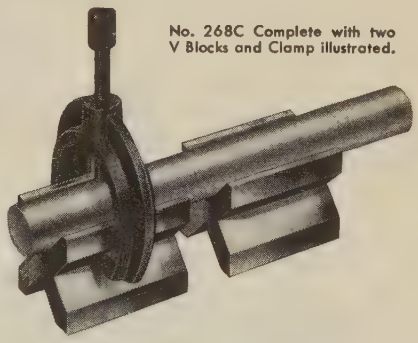
Packed One Pair in a Box

V Blocks and Clamp

No. 268 Series—1⅛ Inch

STARRETT No. 268 V Blocks and Clamp are for general shop use in layout work and for firmly holding circular stock during drilling, milling and grinding operations.

The blocks are made of cast iron and each is 1½ inches square and 2 inches long. The clamp is ribbed for extra strength and will hold work up to 1⅛ inches in diameter. A hole in the knurled head of the screw permits using a pin or rod for tightening work. Blocks are furnished in pairs.



No. 268C Complete with two V Blocks and Clamp illustrated.

Cat. No.	EDP No.	Description	Capacity
268A	51287	Two V Blocks (one pair)	
268B	51288	Clamp, only	
268C	51289	Set Complete, Two V Blocks, (one pair) and Clamp	1⅛"

No. 268C Sent Unless Otherwise Ordered

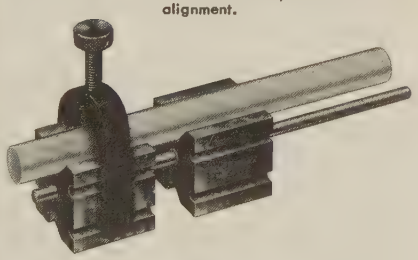
Packed One in a Box

V Blocks and Clamp

Case Hardened Steel

No. 271 Series—1¼ Inch

No. 271C illustrated. Note the steel rod which keeps both blocks in alignment.



The V Blocks of this set are case-hardened and may be used singly or in pairs in layout work and to firmly hold circular stock during drilling, milling and grinding operations. They are also convenient for holding pieces with shoulders as the shoulders may rest between the blocks.

A feature in this set is the 6-inch steel rod which passes through each block and is firmly held by friction bushings. When using the blocks in pairs, the rod keeps the blocks in alignment and holds both of them under the work. The blocks are furnished in pairs and each is 1¼ inches square. There are two grooves in each side to hold the clamp for small or large work. The clamp is a steel forging and will hold work up to 1¼ inches in diameter. The large V is about 13/16 inch and the small V about 13/32 inch across the mouth.

Cat. No.	EDP No.		Capacity
271A	51293	Two V Blocks (one pair)	
271B	51294	Clamp, only	
271C	51295	Set Complete, Two V Blocks, (one pair) and Clamp	1¼"

No. 271C Sent Unless Otherwise Ordered

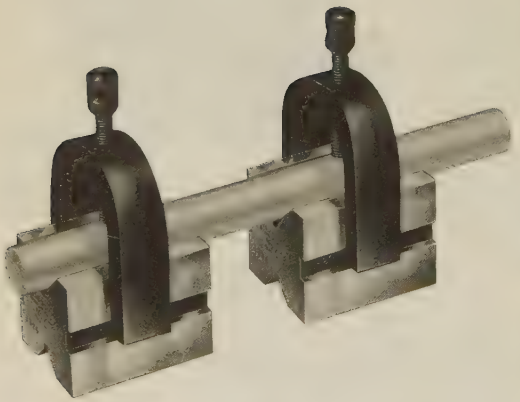
Packed One in a Box

V Blocks and Clamps

Hardened and Ground

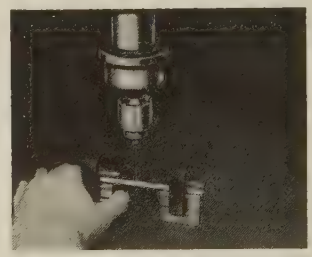
1 Inch

No. 278



No. 278 Set consists of two V Blocks and two Clamps as shown above.

Grinding flat on shaft securely held in No. 278 V Blocks mounted on magnetic chuck.



Drilling small diameter holes in shaft with work clamped in No. 278 V Blocks

Starrett No. 278 V Blocks are precision ground to extreme accuracy. The V's are ground central, parallel and square with the ends and sides. Their accuracy makes them particularly adapted for layout work in connection with a surface plate, angle iron, etc. They will also hold work securely and accurately during drilling, milling, and grinding operations.

The blocks are made of hardened steel. They are manufactured and numbered in pairs, so that the V's in each block are always in alignment. The blocks have a tapped hole through the sides so that they may be attached to an angle iron by a ¼-20 screw. The angle iron holding the blocks can then be attached to a lathe face-plate or held by a magnetic chuck.

Each block is about 1¼ inches square and 1⅝ inches long. The clamps have a clamping capacity of 1 inch diameter.

Cat. No.	EDP No.	Description	Capacity
278	51312	Set Complete, Two V Blocks (one pair) and Two Clamps	1″
278B	51313	Clamp only	

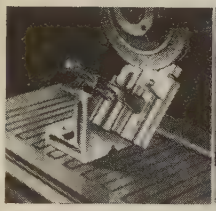
Packed One in a Box

V Block and Clamp

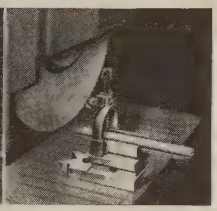
Hardened and Ground

1 5/16 Inch

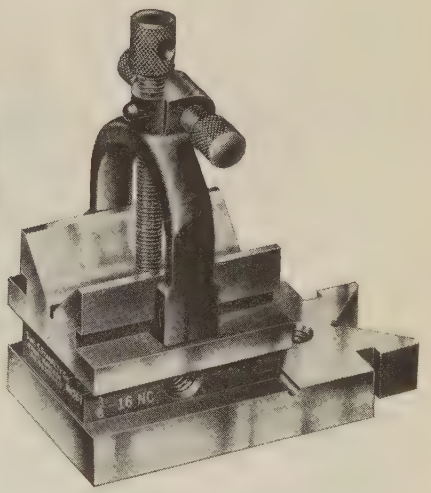
No. 567



For quick 45° grinding job on end of rod, No. 567 V Block sets up quickly on face plate held by magnetic chuck.



A natural for cylindrical work, No. 567 V Block again provides a fast set-up for grinding flat on end of rod.



No. 567 V Block and Clamp shown above

HERE is an improved V Block and Clamp with features not found in other blocks and clamps. It can be used on base, on end, also flat on either side as the clamp is within the outside width of the block. The clamp is provided with an adjustable side screw with caps to support the block and prevent tilting when drilling, grinding or milling. The groove at the stepped end is at a right angle to the base and is handy for holding shouldered studs, round pins, etc. A hole clearance for drilling and removing dowel pins is provided in the block. The block also has four 3/8-16 tapped holes, two in the base and one on each side so that it can be attached to an angle iron. The angle iron holding the block can then be attached to a lathe faceplate or held by a magnetic chuck.

The block is made of special tool steel, hardened and precision ground to extreme accuracy. The sides are ground parallel and the groove is ground central and parallel to the sides and the base. Clamp is made from a forging and nicely finished. The block is approximately 1 1/8 inches square, and the base length is about 3 1/2 inches. Capacity approximately 1 5/16 inches.

Cat. No.	EDP No.	Description	Capacity
567	52588	Set Complete, with one V Block and One Clamp	1 5/16"
567B	70885	Clamp, only	

Packed One in a Box

V Blocks and Clamps

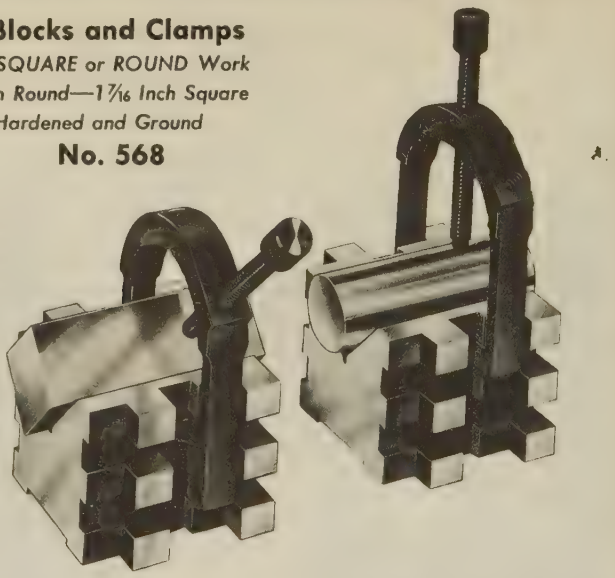
Hold SQUARE or ROUND Work

2 Inch Round—1 7/16 Inch Square

Hardened and Ground

No. 568

No. 568 V-Block shown at left below has clamp in low position with screw at 45° for holding square work. No. 568 V-Block at right has clamp in high position and screw at 90° for holding round work. Size of each block—length 2½", width 2 31/32", height 1 31/32".



- ★ **A Precision V-Block for the Most Accurate Tool Room Work.**
- ★ **Hardened Steel. All Sides Precision Ground Parallel and Square.**
- ★ **V-Groove Ground Central and Parallel to Sides and Base; Perfect Alignment in Matched Pairs.**
- ★ **Holds Square or Round Work. Clamp Has Screw Holes at 45° and 90°.**
- ★ **Permits Grinding Ends of Work Square with Sides.**
- ★ **Stepped Groove Construction Permits Low or High Clamp Mounting for Small or Large Work up to 2" Round, 1-7/16" Square.**
- ★ **Clamps Do Not Project, Permitting Block to be Used on Base, Ends or Sides.**
- ★ **Tapped Holes Permit Mounting Blocks on Face Plates or Angle Irons.**

THE new Starrett No. 568 is a precision V-Block designed for the most accurate toolroom and layout work. Exclusive features give it extra utility and versatility not found in other types of blocks.

By means of special stepped groove and clamp design, the clamp can be mounted on the V-block in a low or high position for small or large work. Clamps do not project; block can be used on base, ends or sides.

The V-block holds both **square** or **round** work since the clamp has screw holes at 45° and 90° permitting positive clamping of each type of work in either position. By means of this feature the block holds round work up to 2" diameter and square work up to 1-7/16" (or 1-9/16" square with screw at top). An added feature are the tapped holes used for mounting the V-block on face plates or angle irons.

The V-block is made of hardened steel. All sides are precision ground parallel and square and the V-groove is ground central and parallel to the sides and base. Clamp is made of steel.

Starrett No. 568 V-Blocks are available as a single V-block and clamp, clamp only, or in a matched pair consisting of two V-blocks with clamps. V-grooves of matched pairs have perfect alignment.

Cat. No.	EDP No.	Description	Capacity
568A	52590	V-Block and Clamp	2" diam. round; 1 7/16" square (1 9/16" with screw at top)
568B	52591	Clamp only	

Cat. No.	EDP No.	Description	Capacity
568C	52592	V-Blocks and Clamps (Matched Pair)	2" diam. round; 1 7/16" square (1 9/16" with screw at top)

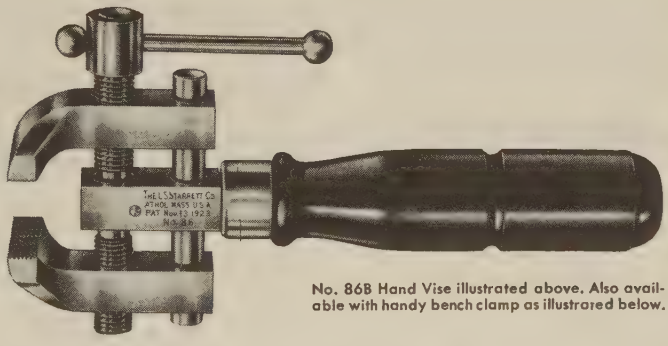
No. 568C (Matched Pair) Sent Unless Otherwise Ordered.

Packed One in a Box

Combination Hand Vise

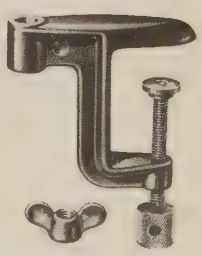
1½ Inch

No. 86 Series

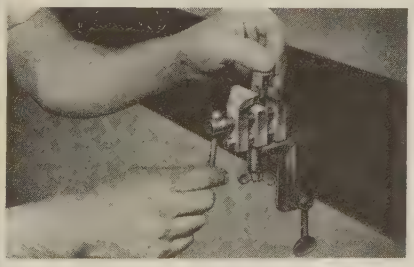


No. 86B Hand Vise illustrated above. Also available with handy bench clamp as illustrated below.

THE STARRETT No. 86 Combination Hand and Bench Vise has a wide range of uses for all toolmakers, mechanics, hobbyists and home workshop owners. For work around the portable machine shop and garage, this tool is practically indispensable. By removing the handle and substituting the clamp, the tool may be fastened to benches, shelves, etc. approximately ½ to 2⅛ inches in thickness, and can be adjusted to different positions according to the convenience of the user. When used as a hand vise, the leverage obtainable with the ball-end lever will be appreciated in comparison with a wing nut commonly employed for this purpose. The jaws are made from forgings and are properly tempered. Width of jaws, 1½ inches. Capacity about 1½ inches. Length, about 7 inches.



Bench Clamp furnished with No. 86A shown above.



No. 86A Hand Vise with Clamp illustrated left.

Cat. No.	EDP No.	Description	Capacity
86A	50404	Hand Vise with Clamp	1½″
86B	50405	Hand Vise, only	1½″

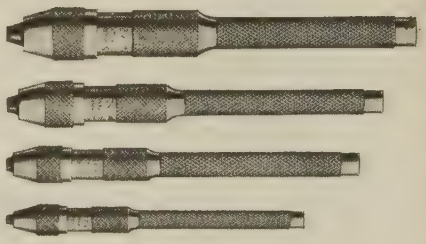
No. 86A Sent Unless Otherwise Ordered.

Packed One in a Box

Pin Vises

No. 162 Series—*0 to .187 Inch or 0 to 4.8 mm (Metric)*

STARRETT No. 162 Pin Vises are useful for holding wires, scriber points, small files, taps, drills, etc. A hole extends through the full length of the handle so that wires of any length may be held. The handle is reduced in size so that it may be rapidly rotated between thumb and finger when filing small work. The jaws are hardened, and with a few turns of the binding nut a firm grip may be obtained with them. The handle and binding nut are nickel plated.



Cat. No.	EDP No.	Range, English	Range, Metric
162A	50599	0–.040″	0–1 mm
162B	50600	.030–.062″	0.8–1.6 mm
162C	50601	.050–.125″	1.3–3.2 mm
162D	50602	.115–.187″	2.9–4.8 mm

Cat. No.	EDP No.		Range
S162	50603	Set, Complete	0–.187″ or 0–4.8 mm—consisting of No. 162A, B, C, D
S162Z	50604	Set, Complete	0–.187″ or 0–4.8 mm—in Attractive, Protective Case

Individual Sizes Packed Six in a Box; Sets, One in a Box

Pin Vises

With Rubber Handle—Octagon Shape

No. 166 Series—*0 to .187 Inch or 0 to 4.8 mm (Metric)*

THESE pin vises are the same as our No. 162 described above, except that they are made with an insulated PVC handle which is octagon in shape thereby making them less apt to roll when laid down.

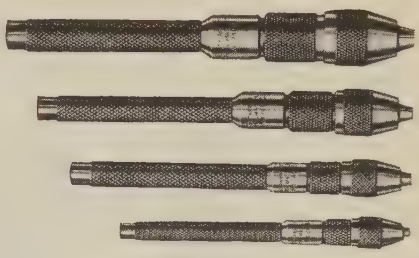
Cat. No.	EDP No.	Range, English	Range, Metric
166A	50609	0 to .040″	.0–1 mm
166B	50610	.030 to .062″	0.8–1.6 mm
166C	50611	.050 to .125″	1.3–3.2 mm
166D	50612	.115 to .187″	2.9–4.8 mm
S166	50613	Set, Complete—0–.187″ or 0–4.8 mm—consisting of No. 166A, B, C, D	
S166Z	50614	Set, Complete—0–.187″ or 0–4.8 mm—in Attractive, Protective Case	

Individual Sizes Packed Six in a Box; Sets, One in a Box

Pin Vises

Double Bevel Collets for Better Grip

No. 240 Series—*0 to .200 Inch or 0 to 5.1 mm (Metric)*



SMALL stock or taps, drills, reamers, scribers, wire, files and other tools can be securely held with these pin vises. Better grip is provided due to special collet design with tapers at both ends which give maximum clamping surface. Hardened for long life.

Good design makes these vises ideal for use in either hand or machine. The handle is knurled adjacent to the chuck, permitting a firm hold with the fingers when tightening the chuck. A straight, smooth section on the handle allows the vise to be held in machine chucks or collets when used for various machining operations. The handle also has a hole extending through its entire length which will accommodate stock up to the full size capacity so that long rods can be gripped close to the end. The end of the handle is knurled to provide a sure grip and has a smaller diameter than the chuck which allows fast opening and closing and rapid rotation between the thumb and finger when filing or forming small work.

Four different sizes to hold a range of work from 0 to .200 inches or 0–5.1 mm diameter. Available either separately or as a complete set in a convenient case. All four vises have heavy nickel plated finish.

Cat. No.	EDP No.	Range, English	Range, Metric
240A	51136	0–.055″	0–1.4 mm
240B	51137	.025–.075″	0.64–1.9 mm
240C	51138	.045–.135″	1.2 –3.4 mm
240D	51139	.110–.200″	2.8 –5.1 mm
S240Z	51140	Set, Complete—0–.200″—consisting of No. 240A, B, C, D in Attractive, Protective Case	

Individual Sizes Packed Six in a Box; Sets, One in a Box

Double End Pin Vise

Reversible Collets

No. 165—*0 to .125 Inch or 0 to 3.2 mm (Metric)*

The Starrett No. 165 Double End Pin Vise is ideal for the mechanic desiring universal features in a single tool. The pin vise is reversible with two size capacities at each end and makes it possible to use either end to suit work requirements.

Well proportioned, nicely nickel plated and precision made throughout, this vise can be used for holding small stock or hand reamers, scribers, wire, files and other tools. The handle has two knurled sections at the center providing a firm grip to permit rapid rotation between thumb and finger when filing or forming small work. The handle also has a hole running through its entire length.

Two chucks, one at each end, are furnished—making it possible for the mechanic to remove the chuck at each end and reverse the chuck to suit the work or tool diameter. Both chucks are split type, and are double ended providing two different size capacities at each end. The chuck at one end holds work or tools 0–.031″ and .093″–.125″ diameter (0–0.8 mm and 2.5–3.2 mm); chuck at the opposite end holds .031″–.062″ and .062″–.093″ diameters (0.8–1.6 mm and 1.6–2.5 mm). Both ends of each chuck are beveled, providing "back support."

Cat. No.	EDP No.	Range, English	Range, Metric
165	50608	0–.125″	0–3.2 mm

Packed One in an Envelope; Six in a Box

"Little Giant" Jack Screws

1½ to 3⅜ Inch

No. 190—No. 191 Series

No. S190 "Little Giant" Jack Screw Complete with all attachments illustrated above. Range 2¼–3⅜"; with all attachments up to 6⅜" maximum.

STARRETT No. 190 and No. 191 "Little Giant" Jack Screws are very handy for leveling work on planer beds, upright drills, setting up machinery and general use in the tool room and machine shop.

No. 190 The Jack (A) is 1¼ inches in diameter at the base and has a range from 2¼ to 3⅜ inches. It will raise 1000 pounds or more. The two extension bases (B and C) are 2 inches and 1 inch high respectively. The extensions may be used singly or together, and when used together, a height of 6⅜ inches may be obtained with the jack.

An auxiliary pointed screw (D) is supplied to be used in place of the screw with swivel cap. Extension base (E) is furnished in places where it is not possible to obtain a bearing on a flat surface. Extension V base (F) is for use against a cylindrical form.

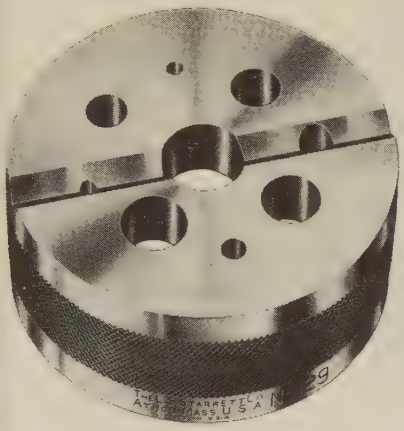
No. 191 The same as the No. 190 except smaller in size. Part A is 1 inch in diameter at the base and has range of 1½ to 2¼ inches. Extension bases B and C are 1 inch and ½ inch high respectively. By using these two extension bases a height of 3¾ inches may be obtained.

*Range 2¼"—3⅜"		*Range 1½"—2¼"		
Cat. No.	**EDP No.**	**Cat. No.**	**EDP No.**	**Description**
S190	50680	**S191**	50687	Set Complete, with all Attachments
190A	50681	**191A**	50688	Jack, only
190B	50682	**191B**	50689	Extension Base
190C	50683	**191C**	50690	Extension Base
190D	50684	**191D**	50691	Auxiliary Pointed Screw
190E	50685	**191E**	50692	Extension Base
190F	50686	**191F**	50693	Extension V Base

*Maximum with attachments: S190, 6⅜"; S191, 3¾"

Sent Complete Unless Otherwise Ordered
Packed One in a Box

Bench Block
No. 129



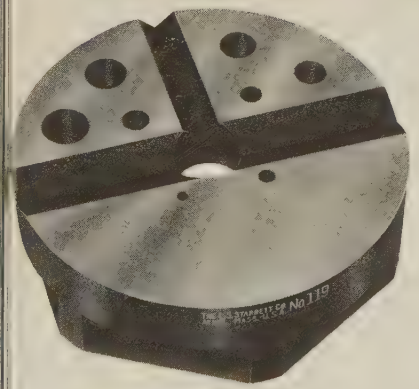
The Starrett No. 129 Bench Block is very handy for holding work when driving pins, drilling, etc. A V groove across the face accommodates round and odd shaped stock. The block is made from steel and is hardened and ground. The smooth finish on the face preserves the finish of the work being held.

The side is knurled to give a good gripping surface, making it easier to handle. The base is recessed to make it lighter in weight and yet sufficiently strong to withstand hard usage. This bench block is approximately 1½ inches high and 3 inches in diameter. The holes vary in sizes from ⅛ to ⅝ inch.

Cat. No.	EDP No.	Description
129	50559	3" diam. x 1½" high with ⅛" to ⅝" holes

Packed One in a Box

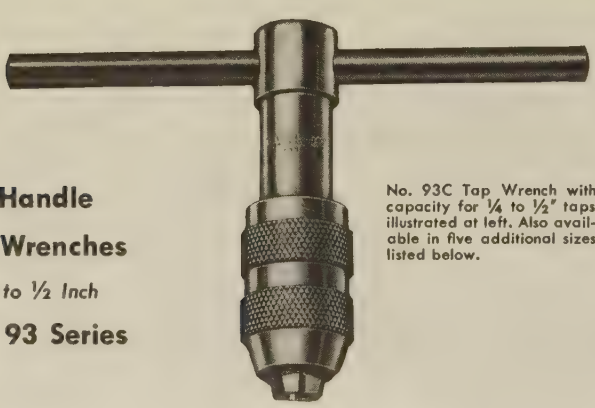
Bench Block
No. 119



WHEN A LARGER, heavy-duty block is required, the Starrett No. 119 Bench Block will be found ideal for all-around machine shop and tool room use. This block weighs five pounds and is approximately 4⅞" diameter on the top working surface, 1½" high, with 9 holes varying from ⅛" to 37/64" diameter and two V-grooves at right angles. The base is hex-shaped permitting the block to be held rigidly in the jaws of a vise. Made from alloy steel, hardened, and ground top and bottom.

Cat. No.	EDP No.	Description
119	50491	4⅞" diam. x 1½" high with nine holes ⅛" to 37/64" diam. and two V-grooves.

Packed One in a Box



T-Handle Tap Wrenches

1/16 to 1/2 Inch

No. 93 Series

No. 93C Tap Wrench with capacity for 1/4 to 1/2" taps illustrated at left. Also available in five additional sizes listed below.

STARRETT No. 93 T-Handle Tap Wrenches are used for holding taps, drills, reamers and other small tools to be turned by hand.

The body is centered enabling the workman to use it on lathe centers or on an upright drilling machine to start the tap straight. The construction is such that the jaws conform to the tool being held making it rigid and less apt to become loose. The jaws in the knurled clamping nuts are properly heat treated to withstand any ordinary use.

All wrenches have a sliding handle which is frictionally held. This feature permits the handle to be positioned so that leverage can be applied when working in close quarters or removed entirely.

The D, E, and F sizes are identical in construction to the A, B and C except that the length of the bodies are proportionately longer. These longer tap wrenches are very handy in machine, automobile service and airplane repair shops where they eliminate the expense of stocking special long taps for work at depths which cannot be reached with wrenches of shorter body lengths.

Cat. No.	EDP No.	Length Body	Capacity Tap Size	Capacity Shank
93A	50427	2 1/8"	1/16–7/16"	1/16–5/32" square
93B	50428	2 5/8"	7/32–7/16"	5/32–1/4" square
93C	50429	3 1/2"	1/4"–1/2"	3/16–5/16" square
93D	50430	6 3/8"	1/16–7/16"	1/16–5/32" square
93E	50431	9 7/8"	7/32–7/16"	5/32–1/4" square
93F	50432	12 3/4"	1/4–1/2"	3/16–5/16" square

Packed One in a Box

Tap Wrenches

1/16 to 3/4 Inch

No. 91 Series

STARRETT No. 91 Tap Wrenches are strong, well proportioned, and easy to handle. They are highly finished, and the gripping surfaces are properly tempered. They will firmly hold square or round shanks. The plunger is operated by the knurled sleeve, and a spring located inside the sleeve causes the plunger to back off the instant pressure is removed by the sleeve.

Cat. No.	EDP No.	Length	Capacity Tap Size	Capacity Shank
91A	50419	5 3/4"	1/16–1/4"	5/64–13/64"
91B	50420	9 1/16"	3/16–1/2"	9/64–3/8"
91C	50421	12 5/8"	3/16–5/8"	5/32–27/64"
91D	50422	16 1/4"	5/16–3/4"	13/64–1/2"

No. 91A Packed One in a Box, Three Boxes in a Carton
No. 91B, C, D One in a Box

Tap Wrench

No. 0 to No. 14

No. 174

THIS is a well designed tap wrench for holding taps, drills, reamers, and other tools up to 1/4 inch in diameter.

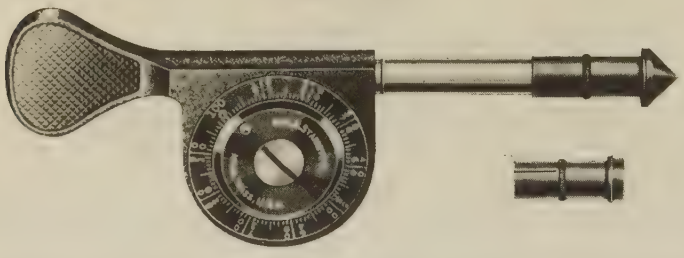
It will firmly grip round or square shanks. It is approximately 3 5/8 inches in length, light in weight, and well proportioned making it particularly adapted for use in holding taps and other tools of small diameters.

It is made from carefully selected steel and highly finished. The gripping surfaces are properly heat treated to withstand any ordinary use.

Cat. No.	EDP No.	Length	Tap Size	Capacity Shank
174	50658	approx. 3 5/8"	No. 0 to 14	1/4" diam.

Packed Six in a Box

0—100 Speed Indicator
No. 104



THE Starrett No. 104 Speed Indicator is used to accurately determine the speeds of machine spindles, shafting and wheels. The working parts are encased, and the spindle revolves on a low friction bearing to avoid overheating at high speeds. The spindle revolves in either direction, and the dial plate is graduated from 0 to 100 revolutions reading left to right or right to left as the spindle may travel.

An improved feature is the rotating friction disc which may be moved to the starting point where the raised knobs coincide. When the indicator point is applied to a revolving shaft, the rotating disc is held from turning by firmly pressing on the raised knob with the thumb; then by releasing the pressure at the desired time the disc will revolve and every 100 revolutions of the spindle is counted by feeling the knob pass under the thumb. Time the number of revolutions for a minute and you get R.P.M.

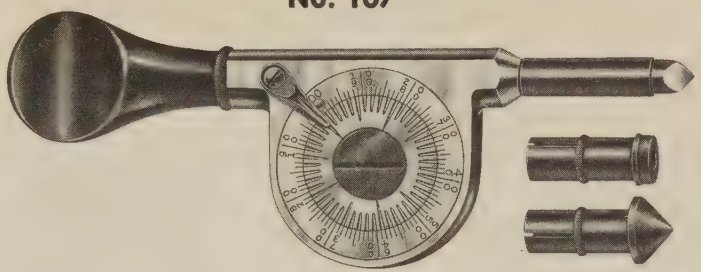
The indicator has black wrinkle finish and nickel plated dials. The indicator is provided with three styles of tips. A pointed hardened and polished steel tip which forms the end of the spindle is used for ordinary speeds. Two rubber tips, one pointed and one flat, are also furnished for high speeds.

Cat. No.	EDP No.	Description	Dial Reading
104A	50468	With Steel Tip and Two Rubber Tips	0-100 Revolutions
104B	50470	With 7½" Spindle, Steel Tip and Two Rubber Tips	0-100 Revolutions

Available With or Without Case (except 7½"); Sent Without Case Unless Otherwise Ordered
Packed One in a Box

0—5000 Registering Speed Indicator

No. 107



THE STARRETT No. 107 Speed Indicator automatically registers the speeds of machine spindles, shafting and wheels and reads directly in total number of revolutions. The working parts are encased, and the spindle rotates on a low friction bearing to avoid overheating at high speeds. The spindle revolves in either direction, and the dial plate reads left to right or right to left as the spindle may run.

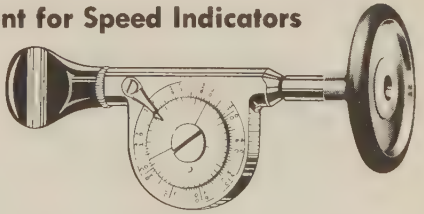
The large dial has one hundred graduations, each graduation representing one revolution of the spindle. The small dial has fifty grooved lines on its face, each representing one hundred revolutions of the spindle (or one complete turn of the large dial). A spring finger attached to the case engages with one of the grooved lines in the small dial and prevents the dial from revolving until the large dial makes one complete turn. With every complete turn of the large dial, the knob trips the spring finger and the small dial moves along one grooved line thus showing that one hundred revolutions of the spindle have been made. One complete revolution of the small dial indicates 5,000 revolutions of the spindle.

The indicator is well finished and nickel plated. A hard rubber handle is an insulation against electricity. Two rubber tips, one flat and one pointed, are furnished in addition to the steel tip.

Cat. No.	EDP No.	Description	Dial Reading
107	50471	With Steel Tip and Two Rubber Tips	0-5000 Revolutions

Available With or Without Case; Sent Without Case Unless Otherwise Ordered
Packed One in a Box

No. 109 Surface Speed Attachment for Speed Indicators



THIS attachment is used in conjunction with STARRETT Speed Indicators to determine the surface speed in feet per minute of shafting, pulleys, wheels, bandsaw blades, etc. It consists of a rubber-tired wheel which fits over the spindle of any one of our Speed Indicators.

Machine operators will find it very helpful in determining whether the machine is running at the correct speed to obtain the best results from the cutting tool.

It is operated by holding the rubber-tired wheel against the outer surface of the object being checked for one minute.

The number of revolutions read on the dial is then divided by 2 to obtain the surface speed in feet per minute since two revolutions of the wheel equal one foot.

Cat. No.	EDP No.	Description
109	50474	Attachment only for No. 104, 107 Speed Indicators

Packed One in a Box

Adjustable Jaw Cut Nippers

Also Available with Tungsten Carbide Tipped Jaws

5½ and 7 Inch

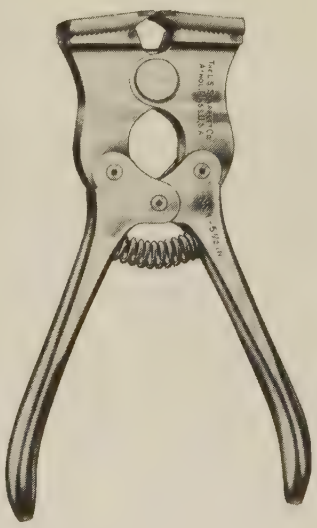
No. 1 Series

STARRETT No. 1 Cut Nippers are particularly recommended for use in wire mills and by piano technicians, linemen, telephone workers, aircraft mechanics and others who are constantly cutting wire. Special design insures powerful leverage for efficient cutting.

The majority of wire cutters or nippers, after becoming dulled or broken, are useless. The jaws of these nippers are detachable and may be removed, reground and adjusted after becoming worn. Each jaw can be ground back approximately ¼ inch and still have a good cutting edge. After being used to the point where it is not practical to grind them further, new jaws can be procured. The jaws are secured to the toothed seat by a screw which engages with a nut in a spline in the frame.

A stud and stop screw inside the handles hold the compression spring and the screw can be adjusted so that too much pressure will not be put on the jaws by forcing them unnecessarily together.

Another feature is the flat safety spring that is fitted below the cutting edges of the jaw and over the joint. This spring forms a yielding seat for the end of the wire to press against while being cut. This eliminates the danger of breaking the jaws as often happens with other styles of cut-nippers which allow the wire to be inserted against a solid surface thereby creating an outward strain on the jaws when they are forced together. The frame and handles are made of steel, highly finished. The frame is heat treated for strength and wear resistance. The jaws are made from a high grade tool steel properly hardened and tempered.



No. 1X—5½" Cut Nipper illustrated above

Jaws are also available with Tungsten Carbide tips for extra-long life.

Each jaw of the 5½ inch size nipper is held by one screw, and each jaw of the 7 inch size is held by two screws.

Hardened Steel Jaws		Carbide Tipped Jaws		Size	Capacity
Cat. No.	EDP No.	Cat. No.	EDP No.		Max. Dia. Wire
1-5½	50000	1X-5½	50004	5½"	.050"
1-7	50001	1X-7	50005	7"	.080"
		Jaws Only (Pair)			
1J-5½	50002	1JX-5½	50006	5½"	—
1J-7	50003	1JX-7	50007	7"	—

NOTE: Available With or Without Tungsten Carbide Tips.
Specify type desired. Furnished with Plain Jaws Unless Otherwise Ordered

Packed One in a Box

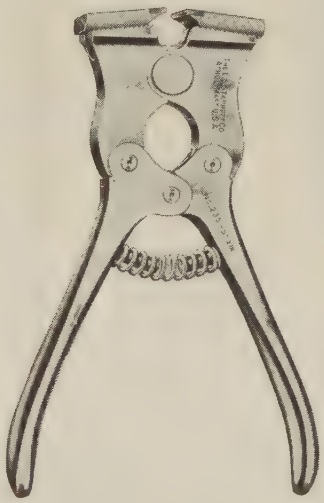
Adjustable Jaw Cut Nippers

For Cutting Tile and Mosaics

Also Available with Tungsten Carbide Tipped Jaws

5½ and 7 Inch

No. 235 Series



No. 235X Cut Nipper illustrated above.

STARRETT No. 235 Cut Nippers are designed for cutting tile. They are identical to No. 1 Cut Nippers except that the jaws are adjusted at the factory for a wider opening. After becoming worn, the jaws may be removed, reground and adjusted or if necessary replaced with new ones. Jaws are also available with Carbide tips for long life.

Hardened Steel Jaws		Carbide Tipped Jaws		Size	Capacity
Cat. No.	EDP No.	Cat. No.	EDP No.		Max. Thickness Tile
235-5½	51066	**235X-5½**	51070	5½″	¼″
235-7	51067	**235X-7**	51071	7″	¼″
		Jaws Only (Pair)			
235J-5½	50002	**235XJ-5½**	50006	5½″	—
235J-7	50003	**235XJ-7**	50007	7″	—

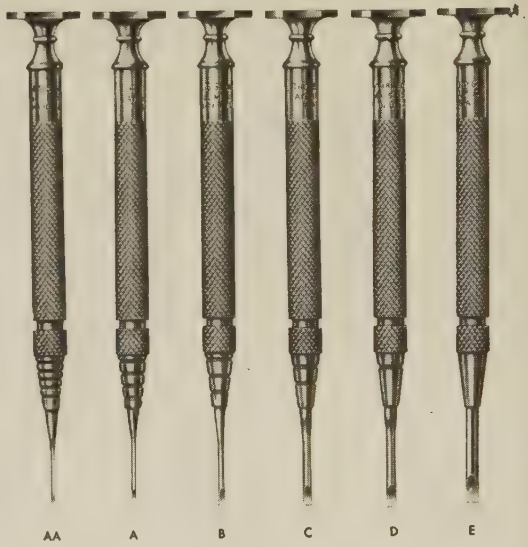
NOTE: Available with or without Tungsten Carbide Tips. Specify type desired. Furnished with Plain Jaws unless otherwise ordered.

Packed One in a Box

Jewelers' Screw Drivers

No. 555 Series

Starrett No. 555 Jewelers' Screw Drivers are shown singly at right and above as a complete set in attractive protective case.



Watch and clock makers, jewelers, opticians, toolmakers and others will find this set of screw drivers especially adapted for fine, delicate work. The bodies are made from steel, knurled and nickel plated. The swivel knobs are concaved to fit the finger and hexagonal in shape to prevent rolling. The blades are of best quality steel, properly tempered. A slight turn of the knurled chucks securely locks the blade so that it will not turn or come out. The chucks are grooved to designate the size of the blades which vary in widths from .025 to .100 inch. Five grooves designate small size AA, four grooves size A, three grooves size B, two grooves size C, one groove size D and the largest size E is plain. Size F also available with blade for Phillips head screws. When not in use the blades can be reversed in the body for carrying the screwdrivers in the pocket.

Overall length 3¾"; body diameter ¼"; blade widths as listed in table.

Cat. No.	EDP No.	Blade Width	Phillips Blade No.	Blade Only Part No.	Blade Only EDP No.
555AA	52549	.025"	—	**2449AA**	70361
555A	52550	.040"	—	**2449A**	70362
555B	52551	.055"	—	**2449B**	70363
555C	52552	.070"	—	**2449C**	70364
555D	52553	.080"	—	**2449D**	70365
555E	52554	.100"	—	**2449E**	70366
555F	52561	—	#0	**14443**	71534

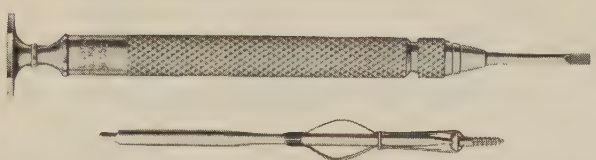
Screwdriver Sets

S555-6	52563	Set of 6 — AA, A, B, C, D, E — Without Case
S555Z-6	52564	Set of 6 — AA, A, B, C, D, E — In Case
S555-7	52565	Set of 7 — AA, A, B, C, D, E, F — Without Case
S555Z-7	52566	Set of 7 — AA, A, B, C, D, E, F — In Case

No. S555-6 Set Furnished Without Case Unless Otherwise Ordered
Individual Sizes Packed Six in a Box; Sets, One in a Box

Opticians' Screw Driver and Holder

No. 552



The No. 552A Screw Driver is furnished with two blades and a handy screw holder, shown at left.

This screw driver is specially designed for opticians, watch and clock makers, etc. for use on small screws. The body is made from steel, knurled and nickel plated. The swivel knob is concaved to fit the finger and hexagonal to prevent rolling. Two nickel plated tempered blades, both .100 inch wide are furnished. One blade is 1⅞ inches long and the other is 2¾ inches long. The sliding, spring-grip screw holder fits over the longer blade and when not needed it may be slipped back out of the way. Pressing the bowed spring opens the jaws to receive the screw head.

Cat. No.	EDP No.	Description
552A	52539	Complete, with Two Blades and Screw Holder
552B	52540	With Two Blades, without Screw Holder

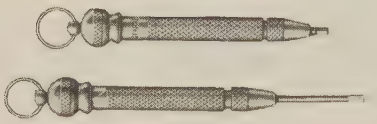
Part No.	EDP No.	Description
99212	71927	Screw Holder Only
2351A	70330	A Blade Only—1-7/8" Long
2377	70335	B Blade Only—2-3/4" Long

No. 552A Sent Unless Otherwise Ordered
Packed Six in a Box

Eyeglass Screw Driver

No. 554

Blade of the No. 554 can be reversed and telescoped within the body of the screw driver as illustrated at right.



A COMPACT, streamlined screw driver highly useful for tightening and removing the many extremely small screws found in radios, sewing machines, electric razors, eyeglasses, etc. This screw driver is made with a chuck to hold the blade firmly in a split socket when in use.

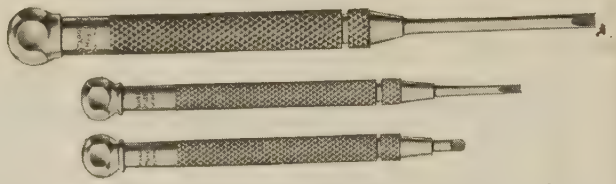
To carry in the pocket, or key-ring or watch chain, the blade may be removed by slightly loosening the chuck, then reversed and telescoped through the socket nearly full length, and held safely by tightening the chuck. Chrome plated. Blade width approximately 1/16".

Cat. No.	EDP No.	Description
554	52547	with Telescoping Blade
2460	70367	Extra Blade

Packed Twelve in a Box

Pocket Screw Drivers

No. 553 Series



Lower illustration at right shows how the blade of No. 553 Screw Drivers can be reversed in the body for convenient carrying in the pocket.

The body is steel, knurled and nickel plated. The head is hexagonal in shape to prevent it from rolling.

The blades are made from best quality steel, properly tempered, and nickel plated. The shank of the blade fits into a solid lock in the body, preventing it from turning. It is held from coming out by a slight turn of the knurled chuck.

When not in use, the blade can be reversed in the body for convenience in carrying the screw driver in the pocket. It takes no more room than a penknife.

Length with blade: A—4¼"; B—5⅝".

Cat. No.	EDP No.	Blade Width	Blade Length	Handle Diameter	Blade Only Part No.	Blade Only EDP No.
553A	52543	.100"	1⅞"	¼"	2351A	70330
553B	52544	.150"	2 13/16"	⅜"	2351B	70331

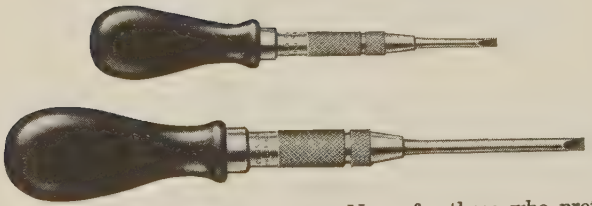
NOTE: Points of No. 70 Scribers (see index) will fit handles of No. 553 Screw Drivers. In ordering, specify A or B size.

Packed Six in a Box

Pocket Screw Drivers

With Wood Handle

No. 559 Series



No. 559 A and B Screw Drivers are illustrated at left.

This screw driver is very similar to our No. 553 listed above, except that it is made with a good feeling wood handle.

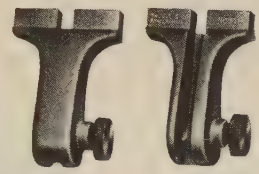
There are many small, inexpensive screw drivers on the market but this was designed for those who prefer a better quality and strength.

Steel parts are nickel plated. Blades reversible, telescoping in handle. Length, with blade: A—4 inches; B—6 inches.

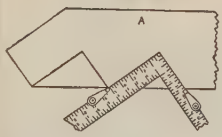
Cat. No.	EDP No.	Blade Width	Blade Length	Handle Diameter	Blade Only Part No.	Blade Only EDP No.
559A	52567	.100"	1⅞"	3/16"	2351A	70330
559B	52568	.150"	2 13/16"	15/16"	2351B	70331

Packed Six in a Box

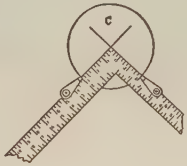
No. 111 Stair Gage Fixtures



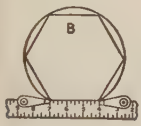
Left Hand Right Hand



A—Laying Out a Stair Stringer



C—Quartering a Circle, Using Square and Fixtures as a Center Gage



B—Laying Out a Hexagon Within a Circle

★ **Nickel Plated For Resistance to Rust.**
★ **Ends Machined Square For True Work Contact, Even Alignment With Square Blade Graduations.**
★ **Non-Removable Thumb Screw Has Brass Contact Point to Prevent Marring.**
★ **Long Machined Slot Assures Good Clamping Surface When Attached to Square Blade.**

A PAIR of these fixtures clamped to a carpenter's framing square forms a handy gage for laying out stair stringers, hip, valley and other rafter cuts, plus many unusual cuts of other types.

Furnished in pairs, one left hand, the other right hand. The fixtures are slotted full length, providing maximum clamping surface when attached to square blade. Ends are machined square for true work contact and even alignment with blade graduations. Thumb screws are non-removable, cannot get lost, and feature brass contact points to prevent marring.

Cat. No.	EDP No.	Length	Width Slot
111 (Pair)	50476	1⅞"	3/16"

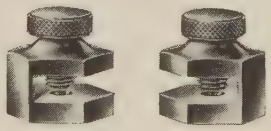
Packed 3 Pairs in a Box

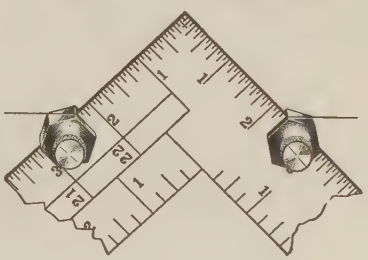
No. 470 Stair Gage Fixtures

★ **Made From Hexagonal Steel Bar Stock, Nickel Plated For Resistance to Rust.**
★ **Slotted to Keep Two Faces at Right Angles to Edge of Square Blade.**
★ **Knurled Thumb Screw Made of Brass Eliminates Marring.**

STARRETT No. 470 Stair Gage Fixtures are made from ¾" hexagonal steel bar stock nickel plated for resistance to rust. Their convenient size and low cost make them a popular favorite of carpenters for laying out stair stringers and various rafter cuts.

Sold in pairs, they are slotted to keep two opposite hexagonal faces at right angles to the edge of square for true work contact and positive alignment with graduations. Thumb screw, with large diameter knurled head, is made of brass to prevent marring.





Cat. No.	EDP No.	Width Across Flats	Width Slot
470 (Pair)	52482	¾"	3/16"

Packed Twelve Pairs in a Box

Master Precision Level

For Setting Up, Checking and Testing Machinery

15 Inch

No. 199Z

- ★ Ground and Graduated Main Vial of 10-Second Accuracy; One Division Equals ½ Thousandths (0.0005) of an Inch Per Foot
- ★ Auxiliary Level Vial Shows Lateral Position and Assists in Horizontal Setting
- ★ Level Vials are Positioned so Breakage is Reduced to a Minimum
- ★ Fool-Proof Adjustment to Avoid Tampering, Once Set
- ★ Special Alloy Iron Employed to Obtain Freedom From Thermal Effects
- ★ Castings Thoroughly Seasoned, Machined and Scraped
- ★ Non-Machined Surfaces Have a Black Wrinkle Finish
- ★ Insulation From Handling By Means of Top Plate of Non-Conductive Material

THE Starrett No. 199 Master Precision Level is especially designed for use in setting up machinery of all types. The efficiency of modern high speed machinery depends to a large degree upon the levelness of the machine set-up. Many times machines are condemned when the entire trouble is caused by improper leveling. With this Master Level machine operators, set-up and maintenance men can tell at a glance the exact variation in the levelness of machinery and make the necessary adjustments.

Cat. No.	EDP No.	Graduation	Length Base	Width Base	Height Level
199Z	50719	10 seconds or .0005" per ft.	15"	1⅝"	3"

Sent in Finished Wood Case
Packed One in a Box

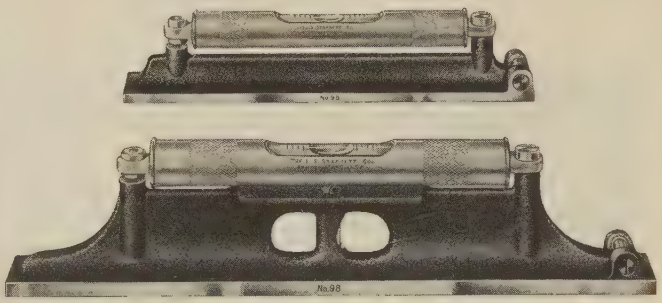
Mechanics' Improved Levels

With Ground and Graduated Vials

4 to 18 Inch

No. 98 Series

End view showing involute groove.



No. 98 Levels in six inch and 12 inch sizes are shown here. The 6 inch size has cross test vial and ground and graduated main vial. The 12 inch size has a cross test vial, ground and graduated main vial and ground plumb vial.

Starrett No. 98 Mechanics' Improved Levels have a ground and graduated main vial. All sizes have a cross test vial, except the 4 inch size. The 12 inch size has in addition a plumb vial, and the 18 inch size a double plumb vial. Plumb vials on 12″ and 18″ Levels are ground.

The main vials are adjustable to positive setting and are housed in a satin chrome brass tube with a friction fit closing cover, to prevent breakage.

The level bases are made of finest quality seasoned castings with black wrinkle finish, accurately machined and finished on the bearing surface. An involute longitudinal groove between the bearing flats provides accurate seating on the round work, such as shafting, etc. This groove has a special involute design permitting better centering and greater capacity to handle larger rounds. Groove and bearing flats are machined in one setting for maximum accuracy.

With the cross test level, it is possible to level simultaneously in both directions to prevent inaccuracies in main vial reading thru canting the level sidewise on round work.

Ground and Graduated Main Vial

Without Case		In Case		Size	Description
Cat. No.	EDP No.	Cat. No.	EDP No.		
98-4	50440	—	—	4″	—
98-6	50441	—	—	6″	With Cross Test Vial
98-8	50442	—	—	8″	With Cross Test Vial
98-12	50443	98Z-12	50444	12″	With Ground Single Plumb Vial and Cross Test Vial
98-18	50445	98Z-18	50446	18″	With Ground Double Plumb Vial and Cross Test Vial

No. 98—12″ and 18″ Levels Available With or Without Finished Wood Case
Furnished Without Case Unless Otherwise Ordered

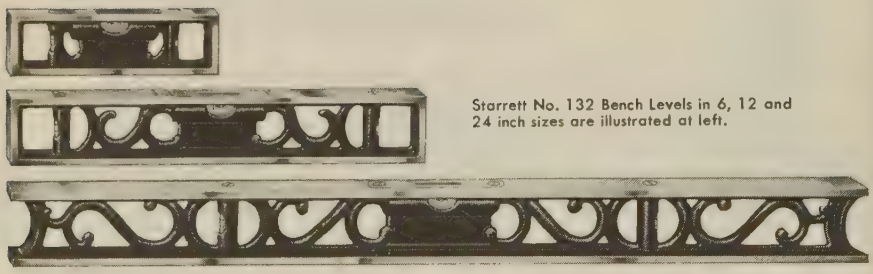
Packed One in a Box

Bench Levels

With Double Plumbs

4 to 24 Inch

No. 132 Series



Starrett No. 132 Bench Levels in 6, 12 and 24 inch sizes are illustrated at left.

An all-around, moderately priced level for machinists, maintenance and setup mechanics, carpenters, etc. Available in a wide range of sizes to suit every requirement, from 4 inches up to 24 inches long. All sizes have a main vial and also a double plumb vial. Vials have two or more graduated lines insuring greater accuracy.

The levels are made of seasoned, quality cast iron with black wrinkle finish and are accurately machined on leveling surfaces.

The bottom of the base has two longitudinal flat lands for use on flat work and between these flat lands a longitudinal, involute groove for accurately seating the level on cylindrical work such as piping, shafting, etc. This groove has a special involute design permitting better centering and greater capacity to handle larger rounds.

The flat lands and groove in the bottom of the base are machined at one setting, thereby assuring complete accuracy.

Cat. No.	EDP No.	Size	Description
132-4	50561	4″	With Main Vial and Double Plumb Vial
132-6	50562	6″	With Main Vial and Double Plumb Vial
132-9	50563	9″	With Main Vial and Double Plumb Vial
132-12	50564	12″	With Main Vial and Double Plumb Vial
132-18	50565	18″	With Main Vial and Double Plumb Vial
132-24	50566	24″	With Main Vial and Double Plumb Vial

NOTE: Levels from 4″ through 12″ have square ends while the 18″ and 24″ sizes have concave ends.

Packed One in a Box

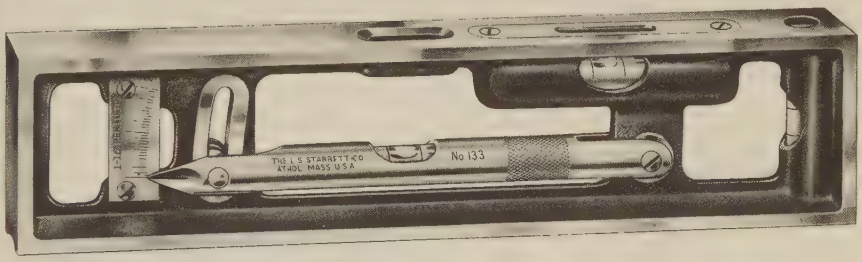
End view showing involute groove.

Engineers' and Plumbers' Levels

With Adjustable Incline Level, Fixed Level and Plumb

10 to 15 Inch

No. 133 Series



No. 133A-10 inch Engineers' and Plumbers' Level illustrated above.

SPECIALLY designed for engineers, plumbers and other mechanics, Starrett No. 133 Levels combine three-uses-in-one by their 3-level feature—a fixed level, a plumb and an adjustable incline level.

The incline level tube has a hinged mounting inside the level frame and after placing the level on any inclined surface is adjusted to the "level" position. The degree of incline is then indicated by the pointer at the end of the level tube and read off a plate graduated in 1/16 inch per foot and reading up to 2 inches per foot incline.

These levels are made of a high grade cast iron with a black wrinkle finish and are precision machined on leveling surfaces. The base has a longitudinal involute groove for accurately seating the level on cylindrical work and also flat lands on either side for use on flat surfaces. This groove has a special involute design permitting better centering and greater capacity to handle larger rounds. Groove and bearing flats are machined in one setting for maximum accuracy. Available with English graduations as listed below.

English Graduation — Shows Any Incline by 16ths from 1/16" per ft. up to 2" per ft.

Cat. No.	EDP No.	Size	Description
133A	50567	10"	With Adjustable Vial, Fixed Vial and Plumb Vial
133B	50568	15"	With Adjustable Vial, Fixed Vial and Plumb Vial

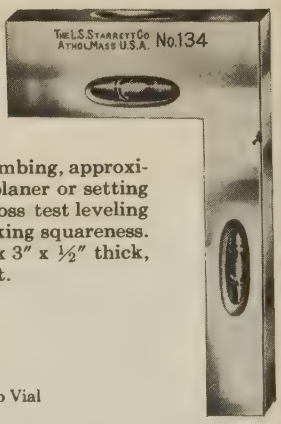
No. 133A Sent Unless Otherwise Ordered
Packed One in a Box

End view showing involute groove

Cross Test Level and Plumb

2 x 3 Inch

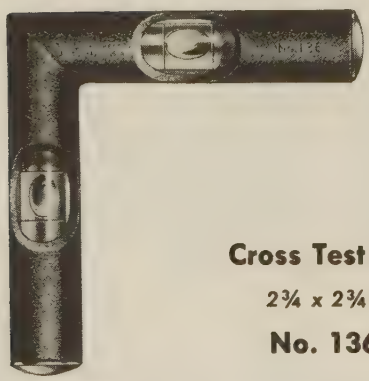
No. 134



THIS is a particularly useful little level and is invaluable for plumbing, approximate squaring and leveling work. Also ideal for use about a planer or setting up machinery. The level has two vials at right angles for cross test leveling without moving the tool and a plumb level at the top for checking squareness. An accurate, well made and reliable tool. Very compact, 2″ x 3″ x ½″ thick, only weighs 3 ounces and can be easily carried in the pocket.

Cat. No.	EDP No.	Size	Description
134	50569	2″x3″x½″	With Cross Test Vials and Plumb Vial

Packed One in a Box



Cross Test Level

2¾ x 2¾ Inch

No. 136

LIKE the No. 134 level above, the Starrett No. 136 Cross Test Level shown at the left has two vials at right angles which permit leveling in both directions without moving the level from the work. This level is compact, measuring 2¾″ x 2¾″ and weighs only 4 ounces. Attractive black wrinkle finish with nickel plated ends.

Cat. No.	EDP No.	Size	Description
136	50572	2¾″x2¾″	With Cross Test Vials

Packed One in a Box

Bench Level

3⅜ Inch

No. 130

A VERY handy and compact bench level 3⅜ inches long with sensitive and accurate single vial. Body made of seasoned cast iron with black wrinkled finish and nickel plated ends. Accurately machined base leveling surface.

Cat. No.	EDP No.	Size	Description
130	50560	3⅜″	With Main Vial

Packed One in a Box

Pocket Levels

Satin Nickel Plated
2½ to 3½ Inch

No. 135 Series

ANOTHER extremely useful Starrett Level that fits handily in the pocket. Available in 2½ and 3½ inch sizes and made from hexagonal stock ⅜ and ½ inch wide respectively. Made with convex ends. Satin nickel plated finish.

Cat. No.	EDP No.	Size	Description
135A	50570	2½″	With Main Vial
135B	50571	3½″	With Main Vial

Packed One in a Box; Six Boxes in a Carton

Line Level

Made of Aluminum—
Weighs only ½ Ounce
3 Inch

No. 108

STARRETT Aluminum Line Levels are used in laying foundations, tile pipe, cement and brick walls, working ditches, determining grades, building roads, trimming hedges, etc. Can also be used as a surface level. Note the reverse position of the slots which prevents its dropping off the line when in use. The lightness of this level tends to eliminate sag in the line. Made from ⅜-inch hexagonal stock 3 inches long and weighing but ½ ounce it may be conveniently carried in the pocket. A luminous level glass with a yellowish fluid which is preferable in line levels is furnished in this level.

This level glass has two graduated lines to check true level, also a metal guard to prevent breakage. The approximate level can be determined with this metal guard.

Cat. No.	EDP No.	Size	Description
108	50473	3″	With Main Vial

Packed One in a Box; Six Boxes in a Carton

Mercury Plumb Bobs

4⅞ to 6½ Inch

No. 87 Series

- ★ **With New No-Roll Head—Hexagonal Head Prevents Rolling.**
- ★ **Greater Weight in Proportion to Short Length and Small Diameter.**
- ★ **Removable Point Hardened and Ground for Greater Accuracy, Longer Life. Easily Replaced in Case of Breakage.**
- ★ **Sure-Grip Knurling on Body for Easy Handling.**
- ★ **Slotted Neck Assures True Hanging—No Knots to Tie—Handy Recess for Winding String.**

For top accuracy in all layout work, construction, surveying, specify Starrett No. 87 Mercury Plumb Bobs. Made from solid steel, they are bored and filled with mercury to provide a low center of gravity and great weight in proportion to short length and small diameter. New No-Roll Hex Head prevents rolling when the Plumb Bob is set down, a great convenience.

Removable point is hardened and ground for greater accuracy, longer life, and body is knurled for easy handling. Since the point is removable it may be easily replaced if broken or worn. Each bob is provided with a strong braided silk line which can be conveniently wound around a recess at the top of the bob.

An outstanding feature which results in the bob hanging perfectly true, is the improved device for fastening the string without a knot to tie or untie, by simply drawing it into the specially shaped, slotted neck at the top.

Cat. No.	EDP No.	Length	Dia.	Weight	Cat. No.	EDP No.	Length	Dia.	Weight
87A	50406	4⅞″	½″	3½ oz.	**87C**	50408	6″	⅞″	12 oz.
87B	50407	5½″	⅝″	6 oz.	**87D**	50409	6½″	1″	16 oz.

Packed One in a box

Steel Plumb Bobs

No. 177 Series

Starrett No. 177 Plumb Bobs are similar in design to No. 87 Series illustrated above, except that the mercury is omitted. Made from solid steel.

Features include new No-Roll Hex Head, removable, hardened, ground point for greater accuracy, knurled body, and slotted neck that assures true hanging of the bob.

Cat. No.	EDP No.	Length	Dia.	Weight	Cat. No.	EDP No.	Length	Dia.	Weight
177A	50660	4⅞″	½″	2¾ oz.	**177C**	50662	6″	⅞″	8½ oz.
177B	50661	5½″	⅝″	5 oz.	**177D**	50663	6½″	1″	14½ oz.

Packed One in a Box

Transit—No. 99

THE new Starrett No. 99 Transit is made to meet the demand of contractors, road builders, carpenters, masons, millwrights, farmers, landscape architects and others for an instrument low in price yet sufficiently accurate for their needs. Engineers and surveyors will find it ideal for use in tough places to preserve higher priced instruments.

Free from complications and confusing adjustments, the Starrett transit is easy to use and read. Lightweight and simply constructed, it is indispensable in laying out building sites, locating batter boards, leveling foundation walls, pouring concrete floors, grading, determining the amount of fall for locating drains, finding height of springs, running fences, laying out fields, orchards, irrigation ditches, roads.

The No. 99 Transit combines features in one instrument that permit measuring angles in both horizontal and vertical planes. Transit is attached to the tripod by a ball and socket screw in the tripod head which screws into the bottom of the transit leveling base. The transit may be moved laterally on the tripod head to accurately position it over a small mark or nail head at the set-up point. The transit is leveled by use of the four mounting screws below the instrument by reference to the lower level vial. The telescope is then brought level by the upper fine adjustment screw as indicated by the telescope level vial. From then on a glance at both level vials will give a check of the continuing level condition of the entire instrument.

The telescope is mounted on a pedestal having a pivot bearing at the center of the leveling base and can be turned in the horizontal plane to any angle through 360 degrees. After loosening a locking screw the pedestal is turned freely by hand to the approximate angle desired. The clamping screw is then locked and the exact angle is arrived at by rotating the fine adjustment screw.

Horizontal angles are read from a horizontal zero reference on the pedestal by a protractor reading to 1 degree and graduated 0-180-0 degrees. The protractor is large in diameter making possible widely spaced graduations for faster, more accurate readings. Surface of the protractor is tapered and has Satin-Chrome finish which makes graduations easy to read at any angle. Protractor is slip-ring type permitting it to be set at any angle in the horizontal plane without disturbing the position of the telescope.

The telescope has a pivot mounting on the pedestal. Any angle of incline or decline from 40-0-40 degrees can be read to 1 degree from a protractor attached to the telescope housing. The protractor has Satin-

(Continued on next page)

Transit—No. 99

- ★ **Inexpensive, Yet Accurate—Popular Choice of Contractors, Road Builders, Landscapers, Farmers for Surveying, Leveling, and Layout Work.**
- ★ **Simple Adjustments, Easy to Use and Read.**
- ★ **Measures Any Angle in Horizontal Plane, Elevation and Depression Angles to 40° in Vertical Plane.**
- ★ **Large Diameter Satin-Chrome Protractors—Tapered Surface with Widely Spaced Graduations for Easier, More Accurate Readings.**
- ★ **Slip-Ring Type Horizontal Protractor—Permits Presetting to Any Angle in Horizontal Plane Without Disturbing Telescope Position.**
- ★ **Fine Adjustment for Both Horizontal and Vertical Protractor Settings.**
- ★ **15-Power Telescope with Fine-Adjustment Focusing—Sun-Shield at Front.**
- ★ **Telescope Line-of-Sight Perfectly Perpendicular to Horizontal Axis Insuring Close Accuracy in Vertical Plane.**
- ★ **Two Spirit Levels for Fast, Accurate Leveling of the Transit.**
- ★ **Ground Level Vials with 4-4½ Minute Accuracy.**
- ★ **Four Leveling Screws Under Transit Base for Leveling on Tripod Head.**
- ★ **Tripod with Ball and Socket Transit Mounting Screw—4'9" Seasoned Wood Legs.**
- ★ **Furnished with Plumb Bob and Tripod in Attractive Finished Wood Carrying Case with Plastic Strap.**

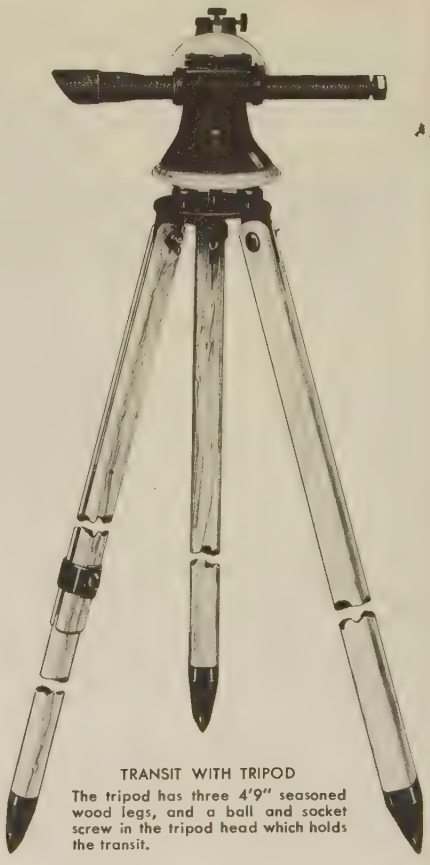
Chrome finish, tapered scale, and widely spaced graduations for easy, accurate readings. The vertical zero reference is attached to the pedestal. The telescope can be turned freely by hand in the vertical plane to the approximate angle and then to the exact angle setting by a fine adjustment screw. 15-power coated lenses in the telescope give good definition in sighting long distances. The telescope has a sun-shield on the front lens to shield out unwanted light and glare and eye-piece focusing with a fine-adjustment knob. Telescope has cross-hairs for focusing on the target. A shutter is provided for the eye aperture to protect it from dirt and breakage.

Telescope pedestal and housing have black wrinkle finish. Telescope tube is made of black anodized aluminum. Vertical protractor and horizontal protractor have no-glare Satin-Chrome finish.

The transit is equipped with a plumb bob and tripod and is furnished in a wood carrying case. The tripod has three 4'9" seasoned wood legs and a ball and socket screw in the tripod head which holds the transit.

A comprehensive booklet with information, instructions, practical problems, and tables is furnished.

See page 272 for No. 999 Leveling Rod and Target.



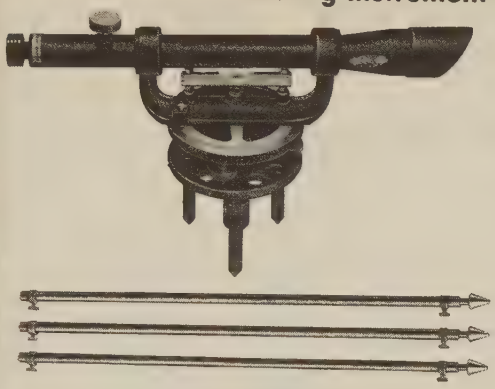
TRANSIT WITH TRIPOD

The tripod has three 4'9" seasoned wood legs, and a ball and socket screw in the tripod head which holds the transit.

Cat. No.	EDP No.	Description
99HZ	50447	With 15-Power Telescope, Two Levels, Plumb Bob and Tripod, in Case; Tripod with 3 Extension Legs, 1 Adjustable, 2 Non-Adjustable.
99JZ	50448	With 15-Power Telescope, Two Levels, Plumb Bob and Tripod, in Case; Tripod with 3 Extension Legs, all 3 Adjustable.
99HL	50449	Set of Extension Legs Only—1 Adjustable, 2 Non-Adjustable.
99JL	50450	Set of Extension Legs Only—All 3 Adjustable.

Packed in Finished Wood Carrying Case; One in a Carton; Shipping Weight Approximately 9 lbs. (Tripod Packed Separately; Shipping Weight Approximately 9 lbs.) No. 99HZ Furnished Unless Otherwise Specified.

Leveling Instrument—No. 101CZ



- ★ **Accurate, Popular Priced Instruments For Road Builders, Contractors, Landscapers, Farmers For All Types of Leveling and Layout Work.**
- ★ **Fast, Easy Adjustments—No Knowledge of Higher Mathematics or Engineering Principles Required.**
- ★ **Takes Any Angle of Complete Circle in Horizontal Plane.**
- ★ **15-Power Telescope on No. 101C with Fine-Adjustment Focusing—Sun-Shield at Front and Shutter for Eye Aperture.**
- ★ **Furnished in Attractive Wood Carrying Case With Leather Strap, Extension Legs and Plumb Bob.**
- ★ **Long, Adjustable Legs.**

Starrett No. 101 Leveling Instrument will do all that No. 99 Transits will do except measure vertical angles. They will take any horizontal angle in a complete circle, and are especially designed for road builders, contractors, landscapers, farmers, carpenters, masons, millwrights, and others for laying out building lots and buildings, locating batter boards, leveling foundations, pouring concrete floors, aligning shafting.

Anyone can use these instruments without knowledge of higher mathematics or engineering principles, and their lightness, simple construction, ease of operation contributes to close accuracy and faster work.

The upper plate connects to the tripod head by a ball and socket joint, can be leveled by four adjusting screws, and locked stationary with a bolt and knurled nut. This plate is recessed to contain an arc reading to 1 degree and graduated 90° each side of 0 for taking horizontal angles. Plate also carries a U-shaped frame with level and telescope. The recessed arc can be turned independent of level and telescope and clamped at any point of a complete circle by throwing a small cam arrangement and placing a spring indexing finger to mesh in the arc graduations.

The telescope on No. 101C has 15-power coated lenses for good definition in sighting long distances. It has a sun-shield on the front lens to shield out unwanted light and glare. Eye-piece has focusing with fine-adjustment knob. Telescope has crosshairs for focusing on the target. A shutter is provided for the eye-piece aperture to protect it from dirt and breakage.

Telescope tube is made of black anodized aluminum. Protractor and level case are finished with protective satin finish—all other parts protected by black wrinkle finish. With short legs, the instrument stands 7 inches high; with long adjustable legs attached, the height can be adjusted from two feet 7 inches to four feet 7 inches. Furnished with Plumb Bob in finished wood carrying case.

A comprehensive Transit and Level Booklet with complete information, instructions and practical problems is furnished with each No. 101 Leveling Instrument. Ask your Starrett distributor for a free copy or write direct.

Leveling Rod and Target

See page 272 for No. 999 Leveling Rod and Target—especially recommended for use with No. 101 Leveling Instruments.

Cat. No.	EDP No.	Description
101CZ	50466	With 15-Power Telescope, Long Legs, Ground Level Vial and Plumb Bob.

Packed in Finished Wood Carrying Case; One in a Carton; Shipping Weight Approximately 20 lbs.
(Long Legs Packed Separately)

Wood Leveling Rods and Plastic Targets

No. 999 Series

For Use With Transits and Leveling Instruments

★ **Seasoned Wood Rods With Bold Black Graduations and Quick Reading Feet in Red For Top Visibility. Heavily Varnished For All-Weather Use.**

★ **Fast-Sighting Light, Durable Plastic Target With Cross Lines Set Off by Alternate Bright Red and White Quadrants.**

★ **Rods Lock Together for Full 8 Foot Range and are Slotted for Easy Up-and-Down Friction Adjustment of Target.**

HERE is an accurate, fast sighting leveling rod and target for use with all types of transits and levels.

The leveling rod is made of seasoned wood furnished in two four-foot sections which are easily and quickly aligned by a positive locking arrangement, giving a total height of 8 feet. Rod bottoms are steel capped to prevent damage and wear, and sides are slotted for easy up-and-down friction adjustment of the target. Bold black graduations with quick-reading feet marked in red assure top visibility, faster reading, and heavy varnishing protects rods and graduations for all-weather use.

The light, durable plastic target features quick-sighting cross lines formed by alternate bright red and white quadrants for faster sighting and aligning with transit or level cross hairs.

Cat. No.	EDP No.	Graduation	Approx. Weight
999A	53112	Feet, Inches, Quarter Inches	1¼ lbs.
999B	53113	Feet and Tenths of a Foot	1¼ lbs.

No. 999A Sent Unless Otherwise Specified

Packed One in a Package

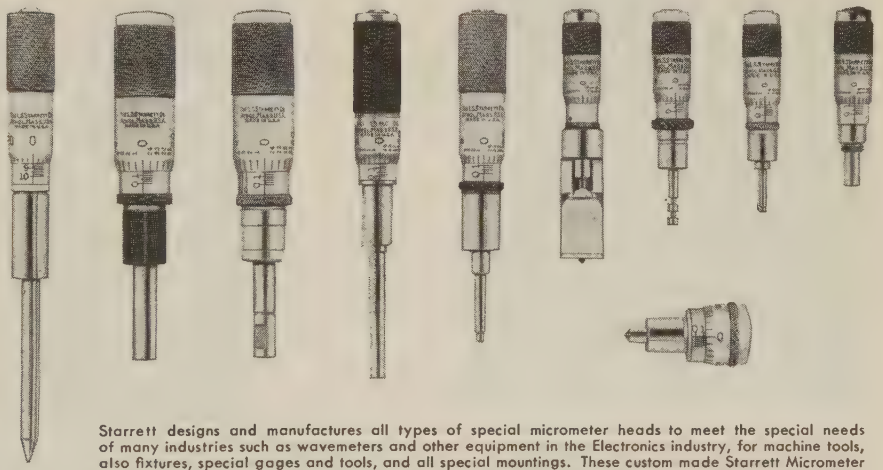
Special Tools

Throughout its history, The L. S. Starrett Company has manufactured a multitude of special hand tools and gages for hundreds of customers in many different industries.

Special toolmaking activities are coordinated under the direction of a special order sales engineer who oversees each order from the time it is entered until shipment is made. Complete manufacturing facilities and engineering counsel are available.

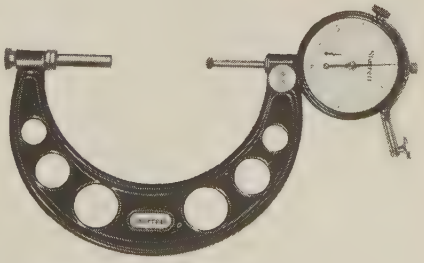
Customers are invited to submit drawings and specifications for prompt quotation. These should be directed to the attention of Special Order Department.

Tools illustrated below are typical examples of Starrett special toolmaking.



Starrett designs and manufactures all types of special micrometer heads to meet the special needs of many industries such as wavemeters and other equipment in the Electronics industry, for machine tools, also fixtures, special gages and tools, and all special mountings. These custom made Starrett Micrometer Heads, some of which are illustrated above, can be furnished to suit your particular requirements in a wide choice of sizes, range and graduations. Available in Stainless Steel, SATIN-CHROME or other corrosion resistant finishes.

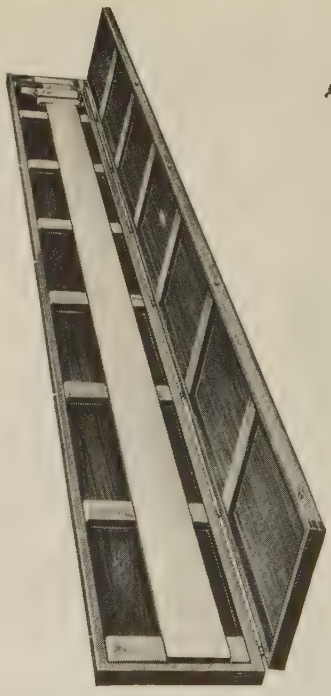
Special No. 725 Deep Throat Tubular Micrometer with sliding, interchangeable anvils and locking lever, 7½″ depth, 0–6″ range.



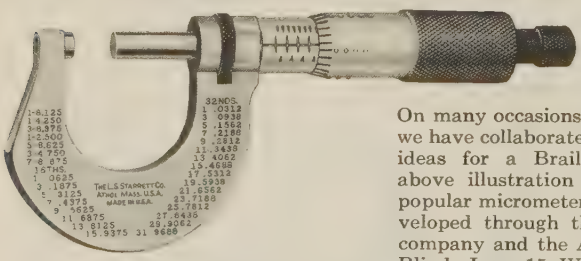
Special No. 224 Micrometer with dial indicator head. Range 2–3″.

Special Tools—Continued

Special No. 724 Micrometer of tubing-type construction, range 60"–66", with interchangeable anvils.



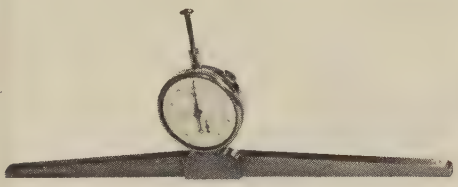
Special No. 122—144" Vernier Caliper with 3" long jaws. Bar graduated in 40ths, reads in .001".



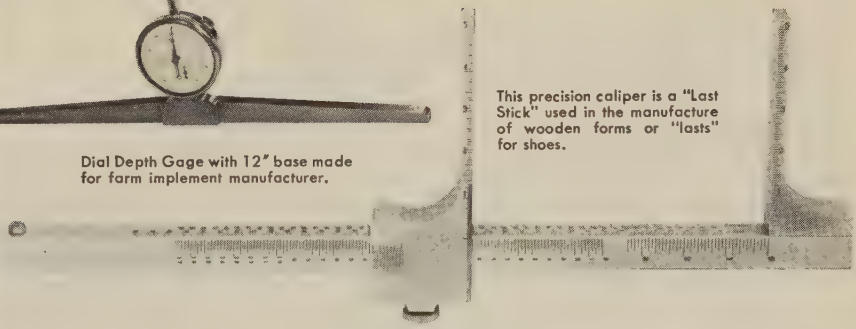
Braille-Reading Micrometer

On many occasions over a long period of years, we have collaborated experimentally on different ideas for a Braille-reading micrometer. The above illustration shows a very efficient and popular micrometer for the blind, which was developed through the joint contribution of our company and the American Foundation for the Blind, Inc., 15 West 16th Street, New York, N.Y. We do not sell this micrometer, we only show it as many readers of our catalog might not learn of it otherwise, and listing it could be very helpful to one blind person and that alone would be sufficient reward for us. We suggest inquiries or orders be sent to the American Foundation for the Blind.

Special Tools—Continued



Dial Depth Gage with 12" base made for farm implement manufacturer.



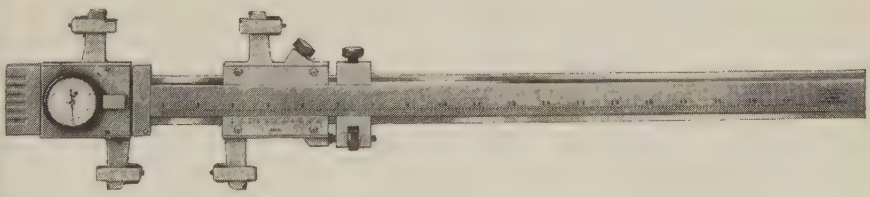
This precision caliper is a "Last Stick" used in the manufacture of wooden forms or "lasts" for shoes.

Master Dial Indicator Vernier Caliper

TWO GAGES IN ONE—A DIAL GAGE COMPARATOR OR A VERNIER CALIPER FOR DIRECT MEASUREMENT

Direct Internal and External Readings
Dial Indicator Reads .0001"—Vernier .001"

No. 1223 Series



No. 1223 consists of a master bar and a vernier slide with two outside and inside jaws. A dial gage sensing unit, also provided with a pair of outside and inside jaws, is mounted at the end of the bar in place of the conventional fixed jaw.

Outside and inside measurements are read directly in thousandths of an inch from the vernier and a single row of graduations on the bar. Out-of-roundness can be checked in ten-thousandths of an inch in the same setting using the dial gage.

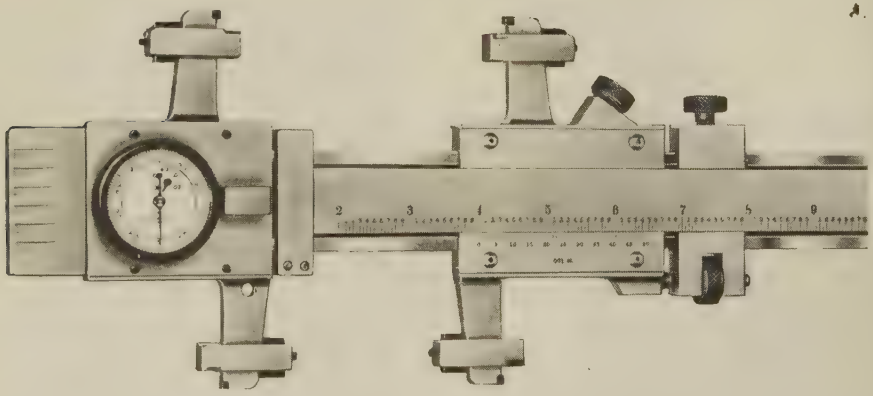
To use the caliper as a comparator, the vernier slide is set to the desired dimension and clamped. Plus or minus variations, outside or inside, are then read directly from the dial indicator.

Open-face design with flush fitting of the vernier scale to the bar scale, in the same plane, eliminates reading errors caused by parallax and insures precise alignment of matching lines on bar and vernier. The 50-division vernier scale with its widely spaced, easy-to-read graduations simplifies settings and readings without the use of a magnifying glass.

The vernier slide and the dial gage head have two sets of jaws, the lower jaws used for inside and the upper jaws for outside measurements. All jaws are carbide faced for long wear. The lower jaws have a radius for proper contact in measuring inside diameters. The upper jaw faces are flat.

Special Tools—Continued

Master Dial Indicator Vernier Caliper—No. 1223 Series—Cont.



Closeup of measuring jaws and dial gage sensing unit on No. 1223 Dial Indicator Vernier Caliper. Two sets of jaws permit direct-reading outside and inside measurements. Caliper can be used as a comparator by the dial gage sensing unit

Added features are the adjustable work rests attached to the jaws permitting the caliper to be placed on the work with the jaws at the correct measuring depth. The work rests have adjustment from 1/8" to 1" and are locked in the desired position by a wedge and locking screw. Work rests are carbide faced for long wear.

The dial gage head or sensing unit has a slide mounted on preloaded ball bearings at the end of the caliper bar. Movement of the jaws on the sensing unit actuates a dial indicator graduated in ten-thousandths of an inch with one complete revolution reading .010". The indicator has a total range of ± .020", each .010" indicated by a tell-tale hand. Plus graduations are shown in black and minus graduations in red. Indicator can be set to zero by a fine adjustment screw or by the bezel. A preload reversing switch on the back of the sensing unit permits instant changeover of the dial indicator for outside or inside readings.

A 4-inch calibration master accurate to ± .00005" is also available at extra charge for checking the relation between the Vernier and dial indicator zero. To check set the Vernier to exactly 4.000", place the master between either "inside" or "outside" jaws, and adjust the dial indicator so that both the small and large hands read zero.

Cat. No.	Size	Range	Vernier Graduation	Dial Gage Head Grad.	Dial Gage Head Range	Width	Bar Thickness	Work Rest Adjustment
1223	18"	2"–18"	.001"	.0001"	±.020"	1 3/8"	3/8"	1/8"–1"
1223	24"	2"–24"	.001"	.0001"	±.020"	1 3/8"	3/8"	1/8"–1"
1223	36"	2"–36"	.001"	.0001"	±.020"	1 3/8"	3/8"	1/8"–1"
1223	48"	2"–48"	.001"	.0001"	±.020"	1 3/8"	3/8"	1/8"–1"

Available With Attractive Protective Case—Sent With Case Unless Otherwise Ordered

Calibration Master Available at Extra Charge
Packed One in a Box

Starrett®

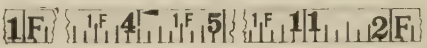
Steel Measuring Tapes

Steel Measuring Tapes—General Information

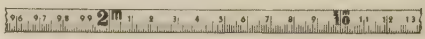
The Complete Line

Starrett Tapes Fit Every Need

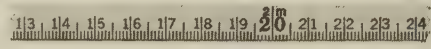
Starrett Precision Tapes are made in a wide range of styles and sizes in English graduations, Metric graduations (M), and Metric and English graduations (M&E) to meet practically every requirement in accurate tape measurement. These include Stainless Steel Tapes, Case Tapes, Oil Gaging Tapes in all standard widths, lengths and graduations. Tape refills without cases are also available for most tapes, as well as plumb bobs and tape hooks.



Starrett WHITE Finish—Tough, Durable, WHITE Baked Enamel on "Phosphatized" Steel. Foot figures and flags for 16" stud centers in red.



Metric Graduations



Metric and English Graduations

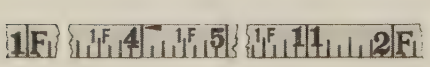
Easy Reading

No Glare for Fast, Accurate Measurement

Starrett Precision Tapes are easy to read, permitting fast accurate measurements and are available with two types of finish, either a hard wearing multi-plate SATIN CHROME or a tough WHITE baked enamel finish.

English measure tapes with ⅜" and ½" lines all have the "Quick Reading" feature with the foot figure appearing before each inch mark. No. C530 SATIN CHROME tapes and No. W530 WHITE tapes have foot figures in red plus red foot figures before every inch mark; also a red flag every 16 inches showing standard stud centers. This allows faster reading and eliminates errors. All metric tapes have the desirable feature of being graduated in millimeters, centimeters and meters the entire length of the line.

Zero or Beginning of Measurement Starts from Outer End of Ring on All Starrett Tapes Except Blank End Tapes.



Starrett No-Glare, Multi Plate SATIN CHROME Finish—Hard Wearing, Stain and Corrosion Resistant. Available on most Starrett Tapes. Foot figures and flags for 16" stud centers in red.

Hi-Accuracy Plus Strength

Special Tape Steel and Heat Treatment

STARRETT Precision Tapes are made of the finest tape steel—heat treated for toughness and carefully tempered—thus insuring high strength and accuracy under the most severe conditions.

Every Starrett Tape is made to bench standards certified for accuracy by the United States Government National Bureau of Standards, Washington, D.C. Standard for temperature is 68 degrees Fahrenheit; co-efficient of expansion is 0.00000645" per inch per degree F. or 0.00774 inch per degree per 100 feet; standard tension for steel tapes up to 100 feet long supported horizontally throughout is 10 pounds.*

*A certificate of accuracy in relation to tension can be furnished on request. Write for further information.

(Continued on next page)

Steel Measuring Tapes—General Information

Special Tapes

For Special Requirements

STARRETT Precision Tapes are also available on special order in special lengths, graduations and materials to suit special requirements or to comply with special governmental weights and measures regulations. For additional information see page 289. They can also be supplied with special firm name or other lettering to meet individual requirements. You are invited to submit your problem on special tapes to our Special Order Department. They'll be glad to work with you in producing special tapes to meet your specific needs.

Blank End Tapes

Available at No Extra Cost

WHEN specified, all Starrett Tapes and Refills, in English, Metric or Metric and English, can be supplied at no extra cost with a 3" blank end. See illustrations below. In ordering blank end tapes add the letter "X" after the tape number.

Typical Blank End Tapes in English and Metric Graduations. Note Location of Zero Point or Beginning of Measurement.

Tape Refills

Tape Lines Only for Replacement

TAPE refills or replacement lines only without cases can be supplied for practically all Starrett Tapes. These will be found listed following the tapes described in this catalog and are identified by the letter "L" preceding the tape catalog number.

Tape Repairs

WE will promptly repair broken steel tapes, in a workmanlike manner, and at a reasonable charge. Such tapes should be sent to our factory at Athol, Massachusetts—not to any of our branches—prepaid, with name of sender plainly marked on the package for identification.

STAINLESS STEEL Tapes, No. 520 Series—*50, 100 Feet*

★ 3/8" Wide Stainless Steel Tape Line with Ring.

★ Rust Proof, Non-Corrosive—for Extra Long Life.

★ Graduated Quick Reading Feet, Inches, Eighths Entire Length of Line.

★ Extra-Durable, Easy-to-Read Graduations.

★ Tough, Durable, Red Vinyl Covering over Electro Plated Steel Liner.

★ Flush, Folding Handle with Push Button Release.

★ Nickel Plated and Satin Finish Trim and Mountings

Line Length	Without Hook			
	Tape		Refill	
	Cat. No.	EDP No.	Cat. No.	EDP No.
50′	**520-50**	55542	**L520-50**	55544
100′	**520-100**	55543	**L520-100**	55545

Tapes and Refills—Packed One in a Box

SATIN CHROME Steel Tapes

Highest Quality with Starrett SATIN CHROME Finish

25, 50, 100 Feet

10, 15, 20, 30m (Metric)

10m & 33′, 15m & 50′, 20m & 66′, 30m & 100′ (Metric and English)

No. C530 Series

★ **EASY READING. Lustrous Black on SATIN CHROME Steel.**

★ **Fast Measurements Assured by EASY-READING Graduations. Quick Reading Foot Figures in Red and Red Foot Figures Before Every Inch Mark. Shows Total Feet and Inches at a Glance.**

★ **Red Flag Every 16 Inches Gives Quick Measurement for Standard Stud Centers.**

★ **Finest Quality Tempered Tape Steel.**

★ **Hard Wearing, Multi-Plate SATIN CHROME Finish Pioneered by Starrett. No Glare, Easy to Read. Eliminates Eye Strain. Highly Resistant to Stains, Corrosion and Wear.**

★ **Direct Bonded Graduations on Steel. Graduations and Figures Recessed Below SATIN CHROME Finish for Maximum Durability and Readability.**

★ **Extra-Long Life and Wear Resistance Assured by Tough, Resilient, Clear Overcoating.**

★ **Tough, Durable, Red Vinyl Covering Over Electro-Plated Steel Case with Satin Finish and Nickel Plated Trim and Mountings. Extra Strong Stainless Steel Case Rings.**

★ **Nylon Rollers at Opening in Case Reduce Wear, Prevent Damage to Tape Line and Case.**

★ **Extra Long Handle Gives Extra Leverage, Easier Operation.**

(Continued on next page)

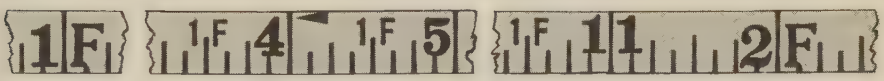
SATIN CHROME Steel Tapes

25, 50, 100 Feet

10, 15, 20, 30 m (Metric)

10 m & 33', 15 m & 50', 20 m & 66', 30 m & 100' (Metric and English)

No. C530 Series



Rust Resistant—No Cracking, Peeling or Chipping—Permanent Markings—Easy Reading, No Glare, No Eye Strain—Quick Reading for Fast Measurements.
Foot Figures in Red plus Red Foot Figures Before Every Inch Mark. Red Flag Every 16 Inches Gives Standard Stud Centers.

Line Length	Without Hook				With Hook			
	Tape		Refill		Tape		Refill	
	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
3/8" SATIN CHROME Line—Graduated Quick Reading Feet, Inches, Eighths Entire Length of Line								
25'	—	—	—	—	HC530-25	55590	LHC530-25	55514
50'	C530-50	55580	LC530-50	55511	HC530-50	55591	LHC530-50	55515
100'	C530-100	55584	LC530-100	55589	HC530-100	55593	LHC530-100	55597
METRIC—3/8" SATIN CHROME Line—Graduated Meters, Centimeters, Millimeters Entire Length of Line								
10m	—	—	—	—	HC530M-10M	55667	LHC530M-10M	55672
15m	—	—	—	—	HC530M-15M	55668	LHC530M-15M	55673
20m	—	—	—	—	HC530M-20M	55669	LHC530M-20M	55674
30m	—	—	—	—	HC530M-30M	55671	LHC530M-30M	55676
METRIC & ENGLISH—3/8" SATIN CHROME Line—Graduated Meters, Centimeters and Millimeters on One Side; Quick Reading Feet, Inches and Eighths on Reverse Side Entire Length of Line								
10m & 33'	—	—	—	—	HC530ME-10M	55677	LHC530ME-10M	55682
15m & 50'	—	—	—	—	HC530ME-15M	55678	LHC530ME-15M	55683
20m & 66'	—	—	—	—	HC530ME-20M	55679	LHC530ME-20M	55684
30m & 100'	—	—	—	—	HC530ME-30M	55681	LHC530ME-30M	55686

Tapes and Refills—Packed One in a Box

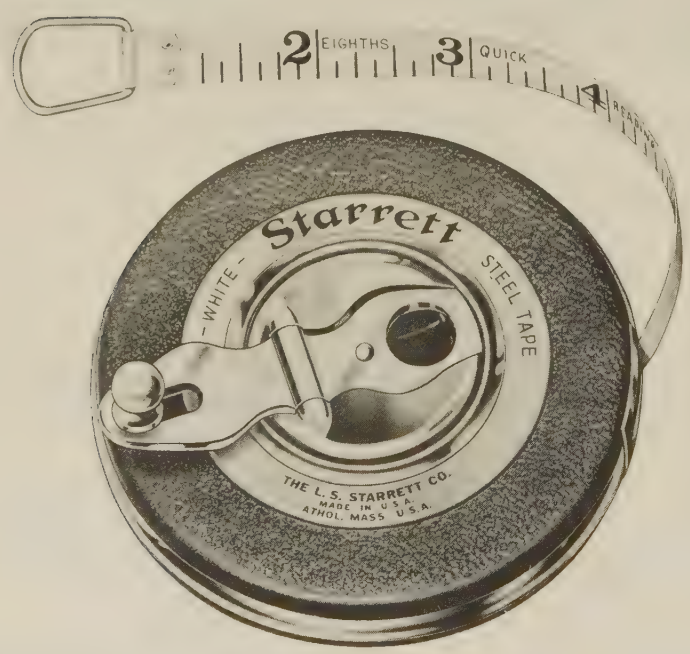
WHITE Steel Tapes

25, 50, 100 Feet; 600 Inch

10, 15, 20, 30 m (Metric)

10 m & 33', 15 m & 50', 20 m & 66', 30 m & 100' (Metric and English)

No. W530 Series



- ★ **EASY READING. Lustrous Black on WHITE Enameled Steel.**
- ★ **Fast Measurements Assured by EASY-READING Graduations. Quick Reading Foot Figures in Red and Red Foot Figures Before every Inch Mark. Shows Total Feet and Inches at a Glance.**
- ★ **Red Flag Every 16 Inches Gives Quick Measurement for Standard Stud Centers.**
- ★ **Finest Quality Tempered Tape Steel.**
- ★ **Special Hard Wearing, Tough, Durable, WHITE Baked Enamel on Specially Treated "Phosphatized" Steel. Resistant to Stains, Corrosion and Wear.**
- ★ **Extra-Long Life and Wear Resistance Assured by Tough, Resilient Clear Overcoating.**
- ★ **Tough, Durable Red Vinyl Covering Over Electro-Plated Steel Case with Satin Finish and Nickel Plated Trim and Mountings. Extra Strong Stainless Steel Case Rings.**
- ★ **Nylon Rollers at Opening in Case Reduce Wear, Prevent Damage to Tape Line and Case.**
- ★ **Extra Long Handle Gives Extra Leverage, Easier Operation.**

(Continued on next page)

WHITE Steel Tapes

25, 50, 100 Feet; 600 Inch

10, 15, 20, 30 m (Metric)

10 m & 33', 15 m & 50', 20 m & 66', 30 m & 100' (Metric and English)

No. W530 Series

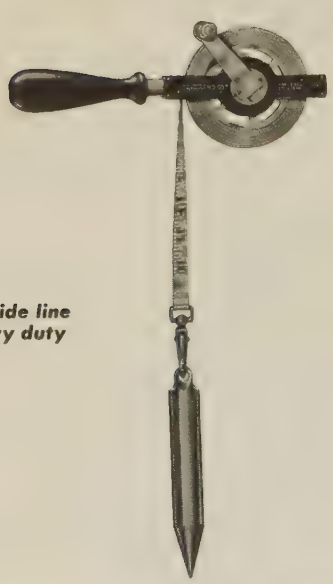
Line Length	Without Hook				With Hook			
	Tape		Refill		Tape		Refill	
	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
3/8" WHITE Line—Graduated Quick Reading Feet, Inches, Eighths Entire Length of Line								
25'	—	—	—	—	**HW530-25**	55654	—	—
50'	—	—	—	—	**HW530-50**	55655	**LHW530-50**	55659
100'	—	—	—	—	**HW530-100**	55657	**LHW530-100**	55661
3/8" WHITE Line—Graduated Consecutive Inches and Sixteenths Entire Length of Line								
600"	**W530CI-600**	56485	**LW530CI-600**	56492	—	—	—	—
3/8" WHITE Line—Graduated Quick Reading Feet, Tenths, Hundredths of a Foot Entire Length of Line*								
50'	—	—	—	—	—	—	**LHW530T-50**	56489
100'	—	—	—	—	**HW530T-100**	56488	**LHW530T-100**	56490
METRIC—3/8" WHITE Line—Graduated Meters, Centimeters, Millimeters Entire Length of Line								
10m	**W530M-10M**	55662	**LW530M-10M**	55692	**HW530M-10M**	55687	**LHW530M-10M**	55709
15m	**W530M-15M**	55663	**LW530M-15M**	55693	**HW530M-15M**	55688	**LHW530M-15M**	55710
20m	**W530M-20M**	55664	**LW530M-20M**	55694	**HW530M-20M**	55689	**LHW530M-20M**	55711
30m	**W530M-30M**	55666	**LW530M-30M**	55696	**HW530M-30M**	55691	**LHW530M-30M**	55713
METRIC & ENGLISH—3/8" WHITE Line—Graduated Meters, Centimeters and Millimeters on One Side; Quick Reading Feet, Inches and Eighths on Reverse Side Entire Length of Line								
10m & 33'	**W530ME-10M**	55697	**LW530ME-10M**	55702	**HW530ME-10M**	55714	**LHW530ME-10M**	55719
15m & 50'	**W530ME-15M**	55698	**LW530ME-15M**	55703	**HW530ME-15M**	55715	**LHW530ME-15M**	55720
20m & 66'	**W530ME-20M**	55699	**LW530ME-20M**	55704	**HW530ME-20M**	55716	**LHW530ME-20M**	55721
30m & 100'	**W530ME-30M**	55701	**LW530ME-30M**	55706	**HW530ME-30M**	55718	**LHW530ME-30M**	55723

*NOTE: Red Foot figures and 16_0 stud flags not furnished on No. W530T Tapes.

Tapes and Refills—Packed One in a Box

"Oilgager" Tapes No. 507 Series

50, 66, 100 Feet; 15, 20, 30 m (Metric)
SATIN CHROME Lines



½" wide line
Heavy duty

- ★ **For Tank Gaging Heavy and Light Oils, Gasoline, etc.**
- ★ **Lines Made of Finest Tape Steel.**
- ★ **Durable, Easy-to-Read SATIN CHROME Finish.**
- ★ **Heavy Duty Hardened Steel Frame in Black Rust-Resistant Finish with Removable Hardwood Handle.**
- ★ **One-Piece Winding Handle Locks Line at Any Setting.**
- ★ **Furnished with or without Precision Made Plumb Bob and Swivel Snap.**

Specifications

Line Length	With Plumb Bob		Without Plumb Bob		Refill-Tape Line Only With Snap, But without Plumb Bob or Frame	
	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
1/2" SATIN CHROME Line—Graduated Quick Reading Feet, Inches, Eighths Entire Length of Line—with No. 515C Innage Plumb Bob						
50′	**C507CB-50**	55454	**C507C-50**	55846	**LC507C-50**	55460
66′	**C507CB-66**	55455	**C507C-66**	55847	**LC507C-66**	55461
100′	**C507CB-100**	55457	**C507C-100**	55849	**LC507C-100**	55463
METRIC—1/2" SATIN CHROME Line—Graduated Meters, Centimeters, Millimeters Entire Length of Line—with No. 515C Innage Plumb Bob						
15m	**C507MCB-15M**	55851	**C507MC-15M**	55855	**LC507MC-15M**	55859
20m	**C507MCB-20M**	55852	**C507MC-20M**	55856	**LC507MC-20M**	55860
30m	**C507MCB-30M**	55853	**C507MC-30M**	55857	**LC507MC-30M**	55861

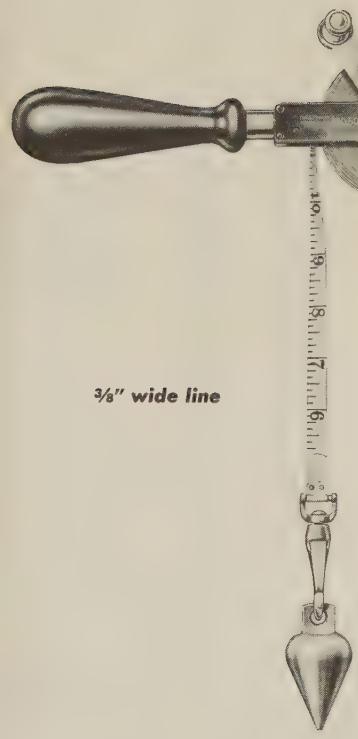
Sent with plumb bob unless otherwise ordered.

Tapes and Refills—Packed One in a Box

"Oilgager" Tapes No. 508 Series

50 Feet; 15 m (Metric)

SATIN CHROME Lines



3/8" wide line

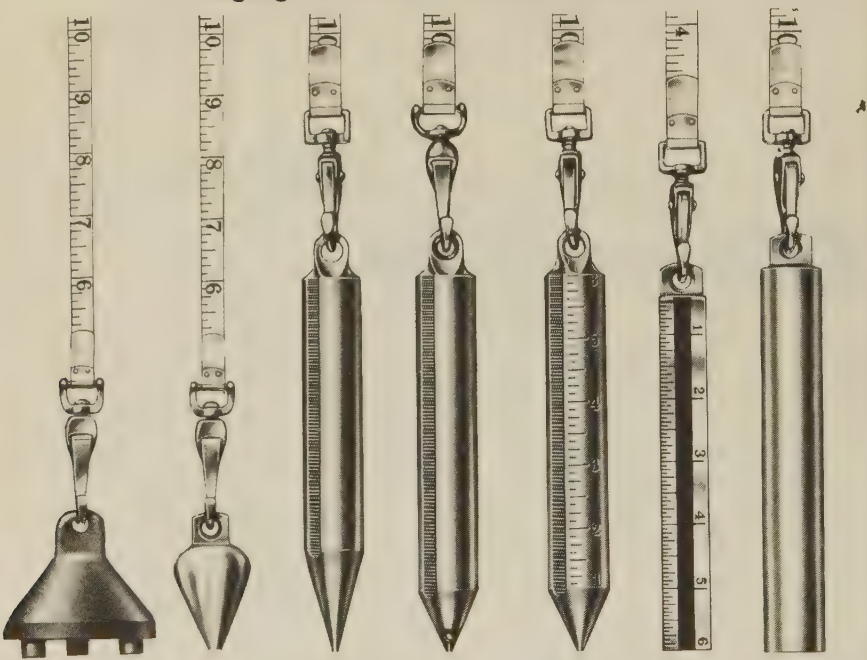
- ★ For Tank Gaging Heavy and Light Oils, Gasoline, etc.
- ★ Lines Made of Finest Tape Steel.
- ★ Durable, Easy-to-Read SATIN CHROME Finish.
- ★ Heavy Duty Hardened Steel Frame in Black Rust-Resistant Finish with Removable Hardwood Handle.
- ★ One-Piece Winding Handle Locks Line at Any Setting.
- ★ Furnished with or without Precision Made Plumb Bob and Swivel Snap.

Line Length	With Plumb Bob		Without Plumb Bob		Refill-Tape Line Only With Snap, But without Plumb Bob or Frame	
	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
3/8" SATIN CHROME Line—Graduated Quick Reading Feet, Inches, Eighths Entire Length of Line—with No. 515B Innage Plumb Bob						
50'	C508BB-50	55481	C508B-50	55872	LC508B-50	55483
METRIC—3/8" SATIN CHROME Line—Graduated Meters, Centimeters, Millimeters Entire Length of Line—with No. 515B Innage Plumb Bob						
15m	C508MBB-15M	55485	C508MB-15M	56640	LC508MB-15M	55487

Sent with plumb bob unless otherwise ordered.

Tapes and Refills—Packed One in a Box

Oil Gaging Plumb Bobs—No. 515 Series



No. 515A
EDP No. 55534

No. 515B
EDP No. 55535

No. 515C
EDP No. 55536

No. 515NS
EDP No. 55541

No. 515D
EDP No. 55537

No. 515E
EDP No. 55539

No. 515F
EDP No. 55540

Innage Plumb Bobs For Measuring Tank Contents

No. 515A—Made of solid brass with three protruding lugs. Weight 17 ounces, length 2⅛", diameter 2⅛". Because of similar length can be substituted for No. 515B.

No. 515B—Solid cone style brass bob. Weight 5½ ounces, length 2⅛", diameter 1¼". Suitable for light oils, gasoline, water, etc.

No. 515C—Solid round style brass bob, serrated on side, with tapered point. Suitable for heavy or light oils. Weight 20¼ ounces, length 6¾", diameter 1".

No. 515NS—Similar to No. 515C but with replaceable eye and tip made of non-sparking beryllium copper. Weight 20¼ ounces, length 6¾", diameter 1".

No. 515D—Solid brass round style bob, serrated side and tapered point. Side has deep cut graduations in 8ths of an inch. Reads from point up, with zero reading at point. Weight 22 ounces, length 6¾", diameter 1". No. 515MD (EDP No. 55538) METRIC Plumb Bob also available with graduations in millimeters.

No. 515F—Solid brass round style with cupped end. Weight 20 ounces, length 6¾", diameter 1". For innage gaging of ship tanks.

Outage Plumb Bob For Measuring Tank Outage

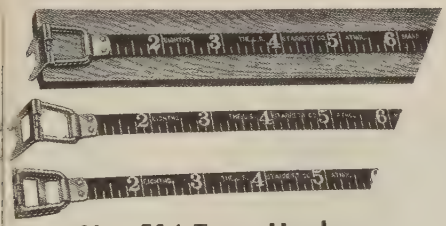
No. 515E—Solid Brass, ¾ inch square, with extra-wide inserted dark strip which augments the oil line showing depth, and is more readily discernible. Graduated in 16ths of an inch reading left to right and with inch markings from top to bottom. The zero point comes at the inside of top of hole. Tapes used with this bob have 0 reading point at the inside of snap. Add oil line reading on bob to tape measurement. Weight 14¾ ounces, length 6⁵⁄₁₆", size ¾" square.

Packed One in a Box

Tape Hooks—Not Detachable

For All ⅜" Wide Steel Tapes

Steel tapes with this type of hook let a single man take measurements unassisted. Large hook has two sharp prongs for firm grip on work. Hook is integral with the tape line ring and folds out of the way when not in use. Measurements taken from inside of hook. To order tapes with hook specify "with hook" after catalog number.



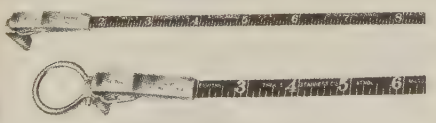
No. 514 Tape Hooks—Detachable

For ⅜" Steel Tapes

These hooks are easily attached and measure from the inside of the hook. No. 514C has a ring on the hook for a fingerhold at the end of the tape for measuring lengths of pipes, casings, steel sheets, etc. Hooks are brass castings with nickel plated finish. Wt.: No. 514A—2 oz.; No. 514C—3 oz.

Cat. No.	EDP No.	Description
514A	55532	Without Ring, For ⅜" Tapes
514C	55533	With Ring, For ⅜" Tapes

Packed One in a Box



No. 705 Tape Wiper

Fits All Starrett "Oilgager" Tapes

Tape Wiper attachment is designed to wipe off oil, dirt, etc. from the tape line as it is reeled in. The tape wiper is one piece and attaches to the tape frame between the frame and handle. The upper pad plate keeps uniform pressure against the tape line and by releasing a bayonet lock can be swung aside for replacing pads or removal. Six extra pads supplied. Weight 4 oz.

Cat. No.	EDP No.	Description
705	55707	Tape Wiper
705P	55708	Extra Pads (Dozen)

Packed One in a Box

Steel Tapes with Special Graduations

Style "C" Tapes

Etched Steel Tapes Only
Feet, Inches, Eighths and Feet, Tenths, Hundredths

No. 507, 508, 520 Steel Tapes can also be furnished with special graduations (reading left to right only) consisting of feet, inches and eighths on one side and feet, tenths and hundredths of a foot on the reverse side. Add "C" to the tape number. Made to order; prices on application.

Style "J" Tapes

Etched Steel Tapes Only
Standard Graduations Only
Diameter Graduations

Steel Tapes can also be supplied in lengths up to 50 feet with standard graduations on one side and diameter graduations in consecutive inches and 64ths or 100ths on reverse side (reading left to right only). By applying these tapes to the outside of any cylindrical object, it is possible to measure the circumference using the standard graduations and at the same time read off the corresponding diameter from the reverse side. Add "J" to the tape number and specify 64ths or 100ths diameter graduations. Made to order, prices on application.

Style "F" Tapes

Feet, Inches and Sixteenths

Instead of the standard graduations on No. 507, 508, 520 Steel Tapes, they can be specially graduated on one side only (reading left to right only) in feet, inches and sixteenths of an inch. Add "F" to the tape number. Made to order; prices on application.

Blank End Tapes

Available at No Extra Cost

When specified, all Starrett Tapes and Refills, in English, Metric or Metric and English, can be supplied at no extra cost with a 3" blank end. See illustrations on page 279. In ordering such tapes add the letter "X" after the tape number.

TOOL CHESTS
No. 200M Series

For Machinists, Tool and Die Makers Apprentices, Mechanics and Home Workshops

The finest tool chest available made to rigid Starrett specifications providing all the desired features required to store quality tools. Ample storage is provided with all drawers lined to avoid damage to tools, rugged steel construction assuring long life. The tool chest can be locked for added protection and to avoid misuse of expensive tools.

Starrett tool chests can be purchased without tools or complete with Starrett tools comprising three different assortments (see page 289) to meet your needs.

SPECIFICATIONS:

- Seven drawers all cloth lined
- Patented spring clips for easy drawer removal
- Friction clips prevent drawers from falling out
- Top storage
- Maroon wrinkle finish
- Dimensions 8½" x 20" x 13¾"
- Shipping weight 31 lbs. (tool chest only)

TOOL CHESTS

Tool chest may be bought with or without tools

Cat. No.	EDP	Description
200MA	56122	Metal chest, complete with 10 tools and accessories listed below
200MB	56123	Metal chest, complete with 14 tools and accessories listed below
200MC	56124	Metal chest, complete with 18 tools and accessories listed below
200M	55207	Metal chest, only

Tool Chests Contents

Cat. No.	Description	200MA	200MB	200MC
T436RL-1	1" Micrometer with Ratchet Stop and Lock Nut	X	X	
11H-12-4R	12" Combination Square with Square Head	X	X	
C391	Center Gage	X	X	X
C309R-6	6" Rule	X	X	X
C604R-6	6" Rule	X		
274-6	6" Inside Caliper	X		
275-6	6" Outside Caliper	X		
277-6	6" Divider	X		
827A	Edge Finder	X	X	X
70A	Scriber	X	X	X
120Z-6	6" Dial Caliper		X	X
120D	Depth Attachment		X	X
196A1Z	Universal Dial Test Indicator		X	
S229FZ	Telescoping Gages		X	
172A	Thickness Gage		X	X
278	V Blocks and Clamps		X	X
S117PC	Set of 5 Center Punches		X	X
711GCSZ	Complete - Last Word Test Indicator			X
T230XRL	Satin Chrome Micrometer			X
C604RE-6	6" Satin Chrome Rule		X	X
33HC-12-4R	12" Combination Square with Square Head and Center Head			X
20-4½	4½" Hardened Steel Square			X
S579GZ	Telescoping Gages			X
257A	Surface Gage - 9" with Hardened Base			X
472	Screw Pitch Gage			X
161B	Parallel Clamps			X
1620	Tool and Instrument Oil	X	X	X
M1-93409	2 oz. All Purpose Lubricant	X	X	X
28	Catalog and Price List	X	X	X
—	Tool and Rules Booklet	X	X	X
—	Starrett Story Booklet	X	X	X
—	Decimal Equivalent Card	X	X	X
—	Memo Book	X	X	X
200M	METAL TOOL CHEST	X	X	X

See page 498 for additional tool sets.

PACKAGING FOR THE RETAIL TRADE

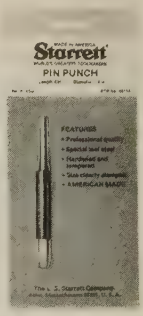
Over 600 items have been chosen for retail packaging. These items are packaged three ways:

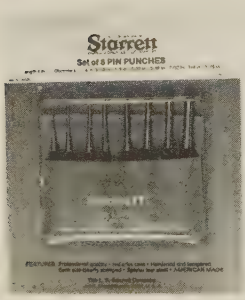
BOXES — Attractive 4-color boxes with reuseable plastic tray and cover for storage.

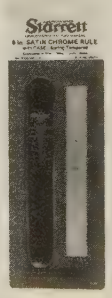
POUCHES — Made of red vinyl with clear front.

BLISTER CARDS — High visibility red and yellow card with clear blister.

All packaging is clearly labeled and has pre-cut holes for use on pegboard. Please refer to Bull. 132W for complete listing.







Starrett

Dial Indicators, Dial Gages

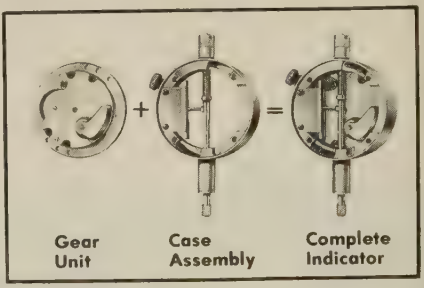
Dial Indicator Features

SHOCKLESS HARDENED STEEL GEAR TRAIN

Dial indicators made to specifications of the American Gage Design Committee are identified by the symbol AD on the dial. By means of the uniform standards formulated by AGD, universal interchangeability of dial indicators is obtained. Starrett high precision, low friction dial indicators, built to AGD specifications, are made in combinations of diameter, graduation, dial reading and range to meet every quality control need.

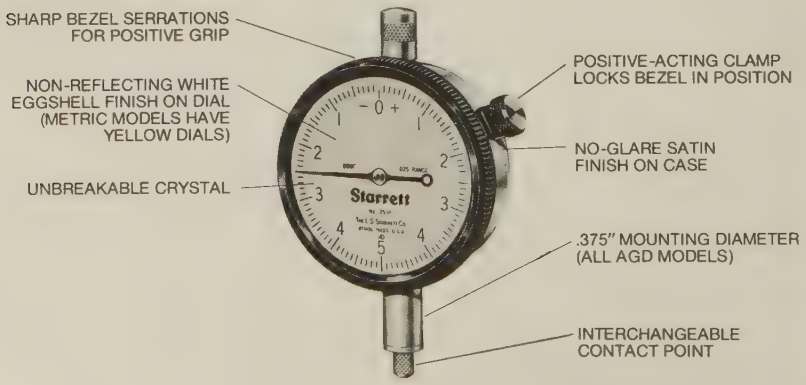
- ★ **Over 180 models—industry's most complete line**
- ★ **Five series—No. 81 (AGD Group 1), No. 25 (AGD Group 2), No. 655 (AGD Group 3), No. 656 (AGD Group 4) and No. 80 (Miniature)**
- ★ **English and metric graduation**
- ★ **Long range models (AGD design except for extended travel)**
- ★ **Balanced or continuous dials**
- ★ **Jewel or plain (bronze inserted) bearings**
- ★ **Complete line of attachments and accessories**

Hardened Gears Starrett AGD dial indicators have a hardened stainless steel rack, pinions and gears which resist shock and extend wear life to a remarkable degree. These moving parts are finished to extremely fine tolerances, delivering a smooth, sensitive action that minimizes friction and lost motion and insures precise repetitive readings. Where the rack is subject to repeated severe and *excessive* mechanical shocks, many Starrett AGD dial indicators may be ordered with a special nonshock mechanism. See page 314.



Unit Construction The gear unit of Starrett AGD dial indicators is identical and interchangeable in Series 25, 655 and 656 case assemblies. Any gear unit and any case assembly can be combined to produce a complete indicator. Additionally, by interchanging gears, pinions and dial faces between gear units, over 100 indicators conforming to AGD graduations and ranges can be assembled. If you service your own dial indicators, the Starrett system of interchangeable assemblies and parts can save considerable gage maintenance costs.

Balanced or Continuous Dials Starrett AGD indicators are available with balanced dial (plus on right) or continuous dial (reading clockwise) as shown. Balanced dial sent unless otherwise ordered. Dials on English


SHARP BEZEL SERRATIONS FOR POSITIVE GRIP
NON-REFLECTING WHITE EGGSHELL FINISH ON DIAL (METRIC MODELS HAVE YELLOW DIALS)
UNBREAKABLE CRYSTAL
POSITIVE-ACTING CLAMP LOCKS BEZEL IN POSITION
NO-GLARE SATIN FINISH ON CASE
.375" MOUNTING DIAMETER (ALL AGD MODELS)
INTERCHANGEABLE CONTACT POINT
Starrett

Dial Indicator Features—Cont.

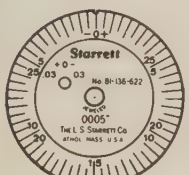
reading indicators have non-reflecting white finish; metric reading indicator dials have non-reflecting yellow finish.

Balanced Dial

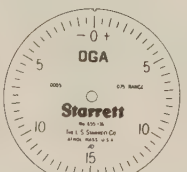
Continuous Dial

Revolution Counters All AGD indicators with 2-1/2 revolutions (page 296) can be furnished with double dial and count hand at slight additional cost. Intermediate and long-range indicators (pages 309-312) have revolution counters.

Plus and Minus Graduations Plus and minus readout—black figures clockwise, red figures counterclockwise, or colors reversed—are available on certain series 81 Dial Indicators. See page 299.



Dial with plus and minus graduations



Dial with special trademark imprint

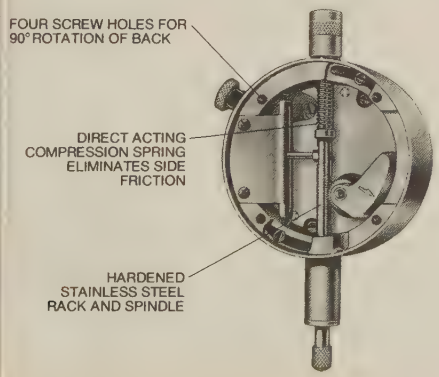
Special Dials Starrett dial indicators can be furnished with any standard dial marked with your company name or trademark. There is no charge when the indicators are purchased in lots of 25 or more. For quantities under 25, a slight additional charge is made. Prices on request.

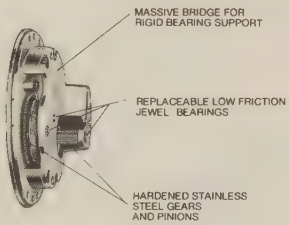
Specifications Starrett AGD dial indicators are furnished with hardened stainless steel rack, pinions and gears; balanced dial (*plus* reading clockwise); lug-on-center back; and a standard 1/4" long x 13/64" diameter contact point with radius. Dimensions and specifications for all models are listed on page 296.

Anti-Magnetic Mechanism An anti-magnetic mechanism can be furnished on most Series 81, 25, 655 and 656 dial indicators up to 1" range and also on No. 196B6 Universal Dial Test Indicator. This mechanism is desirable when the indicator is used near a magnetic chuck or similar magnetic field which would disturb its operation. See individual listings for availability.

Attachments and Accessories A variety of attachments and accessories are provided for mounting dial indicators on machine tools, inspection equipment and special fixtures. These include backs, contact points, dust guard, hole attachments, special nonshock mechanism, spindle travel controls, stem and back mounting accessories, tolerance and maximum reading hands. See index.

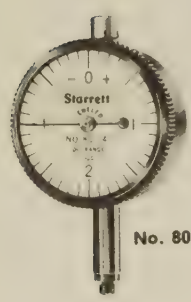
Other Gages This catalog also shows a variety of gages with indicator-type readout—dial bench gages, dial test indicators, electronic gages, dial hand gages and magnetic base indicator holders. See index.


FOUR SCREW HOLES FOR 90° ROTATION OF BACK
DIRECT ACTING COMPRESSION SPRING ELIMINATES SIDE FRICTION
HARDENED STAINLESS STEEL RACK AND SPINDLE


MASSIVE BRIDGE FOR RIGID BEARING SUPPORT
REPLACEABLE LOW FRICTION JEWEL BEARINGS
HARDENED STAINLESS STEEL GEARS AND PINIONS

Miniature Dial Indicators
No. 80 Series

1-17/64" Diameter, 7/32" Stem

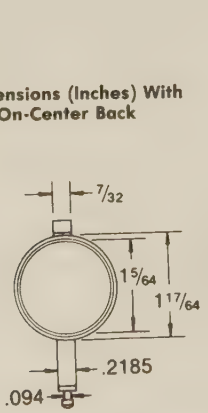


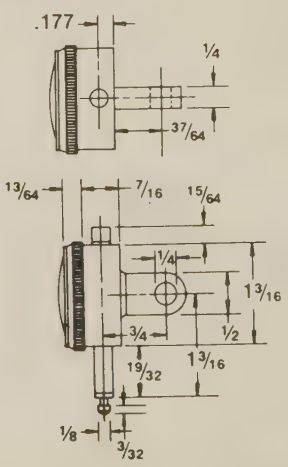
Similar in design to AGD dial indicators, these miniatures are built for measuring bed travel on machines, gaging fixtures and for gaging dimensions in tight places. Equipped with high precision, low friction movements, they are made in three models, all with frictionally adjustable bezels for quick, positive zero setting. No glare, white eggshell finish dials. Black bezel, satin chrome finish on case. Furnished with balanced dial, jeweled bearings and lug-on-center back. Supplied on request with other backs shown on the next page. Backs for unusual mounting applications manufactured to order.

Cat. No.	EDP No.	Dial Diameter	Stem Diameter	Graduation	Reading	Range	Revolutions of Hand
80-114J	55891	1-17/64"	7/32"	.0001"	0-2-0	.010"	2½
80-134J	55892	1-17/64"	7/32"	.0005"	0-10-0	.050"	2½
80-144J	55893	1-17/64"	7/32"	.001"	0-20-0	.100"	2½

Packed one in a box.

Dimensions (Inches) With Lug-On-Center Back

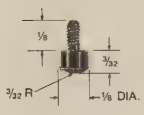




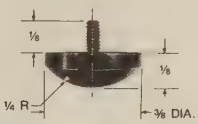
Free drafting template available for this size. Write the L. S. Starrett Co., Athol, MA 01331

Miniature Dial Indicators
No. 80 Series—Accessories

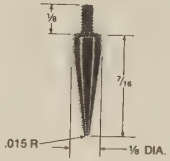
Contact Points. Regular Contact Point furnished as standard on all No. 80 Dial Indicators. Button, Cone and Flat Contact Points furnished to order. All have #0-80 thread. In ordering, specify name and mention No. 80 Miniature Dial Indicator.



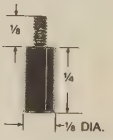
Regular Point
Part No. 25044
EDP No. 72023



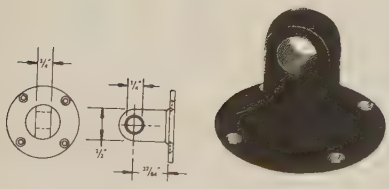
Button Point
Part No. 25159
EDP No. 72024



Cone Point
Part No. 25161
EDP No. 72025



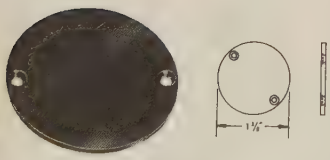
Flat Point
Part No. 25160
EDP No. 72026



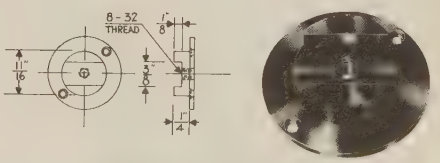
Lug-on-Center Back
Part No. 25053, EDP No. 72027

Backs

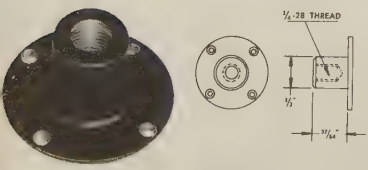
Lug-On-Center Back furnished as standard on all No. 80 Dial Indicators. Flat Back furnished to order at no extra charge. Screw Type Lug, Adjustable Bracket and Post Type Lug Backs furnished to order at slight extra charge. In ordering, specify name and mention No. 80 Miniature Dial Indicator.



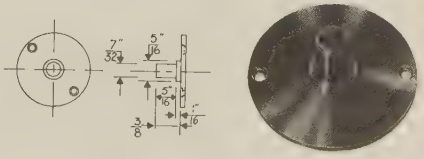
Flat Back
Part No. 25079, EDP No. 72028



Adjustable Bracket Back
Part No. 25157, EDP No. 72029



Screw Type Lug Back
Part No. 25071, EDP No. 72030



Post Type Lug Back
Part No. 25158, EDP No. 72031

Series 81, 25, 655 and 656 AGD Dial Indicators

SHOCKLESS HARDENED STEEL GEAR TRAIN

This is a comparison table and index only. Refer to specific pages listed for catalog numbers with correct suffix letter; EDP numbers; special nonshock or anti-magnetic mechanism; count hands and tolerance hands.

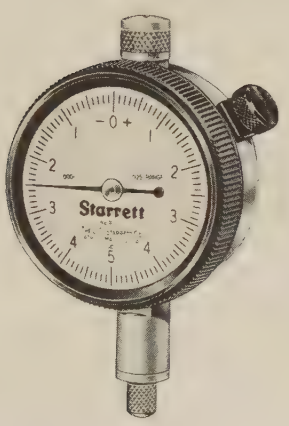
Specifications

Graduation	Dial Reading	Range: One Rev.	Range: Total	No. 81 Series	Page	No. 25 Series	Page	No. 655 Series	Page	No. 656 Series	Page
				ENGLISH READING							
.00005"	.0015-0-.0015	.....	.003"	.....		25-106 "DIAL-MASTER"	300	.....		.....	
	0-3-0	.006"	.015"	.....		25-109	300	.....		656-109	306
	0-6	.006"	.015"	.....		25-209	300	.....		656-209	306
.0001"	0-3-0	.006"	.015"	.....		25-116	300	.....		.....	
	0-4-0	.008"	.020"	.....		25-118	300	655-118	303	656-118	306
	0-8	.008"	.020"	.....		25-218	300	.....		.....	
	0-5-0	.010"	.025"	81-111	297	25-111	300	655-111	303	656-111	306
	0-10	.010"	.025"	81-211	297	25-211	300	655-211	303	656-211	306
	+0-10 −0-10	.010"	.025"	81-111-624	299	.....		.....		.....	
	+0-10 −0-10	.010"	.025"	81-111-630	299	.....		.....		.....	
.00025"	0-5-0	.010"	.200"	.....		25-511	300	655-511	303	656-511	306
	0-10	.010"	.200"	.....		25-611	300	655-611	303	656-611	306
	0-10-0	.020"	.400"	.....		.....		.....		656-517	309
	0-20	.020"	.400"	.....		.....		.....		656-617	309
	0-5-0	.010"	.025"	81-124	297	25-124	300	655-124	303	656-124	306
	0-10	.010"	.025"	81-224	297	25-224	300	655-224	303	656-224	306
	0-10-0	.020"	.050"	81-128	297	25-128	300	655-128	303	656-128	306
	0-20	.020"	.050"	81-228	297	25-228	300	655-228	303	656-228	306
	0-15-0	.030"	.075"	.....		.....		655-129	303	656-129	306
	0-30	.030"	.075"	.....		.....		655-229	303	656-229	306
.0005"	0-10-0	.020"	.050"	81-134	297	25-134	300	655-134	303	656-134	306
	0-20	.020"	.050"	81-234	297	25-234	300	655-234	303	656-234	306
	0-15-0	.030"	.075"	81-136	297	25-136	300	655-136	303	656-136	306
	0-30	.030"	.075"	81-236	297	25-236	300	655-236	303	656-236	306
	+0-30 −0-30	.030"	.075"	81-136-622	299	.....		.....		.....	
	+0-30 −0-30	.030"	.075"	81-136-623	299	.....		.....		.....	
	0-20-0	.040"	.100"	81-138	297	25-138	300	655-138	303	656-138	306
	0-40	.040"	.100"	81-238	297	25-238	300	655-238	303	656-238	306
	0-25-0	.050"	.125"	81-131	297	25-131	300	655-131	303	656-131	306
	0-50	.050"	.125"	81-231	297	25-231	300	655-231	303	656-231	306
	0-50	.050"	.500"	.....		25-431	309	.....		.....	
	0-50	.050"	1.000"	.....		25-631	309	.....		.....	
.001"	0-10-0	.020"	.050"	81-142	297	25-142	300	655-142	303	656-142	306
	0-20	.020"	.050"	81-242	297	25-242	300	655-242	303	656-242	306
	0-15-0	.030"	.075"	81-143	297	25-143	300	655-143	303	656-143	306
	0-30	.030"	.075"	81-243	297	25-243	300	655-243	303	656-243	306
	+0-30 −0-30	.030"	.075"	81-143-628	299	.....		.....		.....	
	0-20-0	.040"	.100"	81-144	297	25-144	300	655-144	303	656-144	306
	0-40	.040"	.100"	81-244	297	25-244	300	655-244	303	656-244	306
	0-25-0	.050"	.125"	81-145	297	25-145	300	655-145	303	656-145	306
	0-50	.050"	.125"	81-245	297	25-245	300	655-245	303	656-245	306
	0-50-0	.100"	.250"	81-141	297	25-141	300	655-141	303	656-141	306
	0-100	.100"	.250"	81-241	297	25-241	300	655-241	303	656-241	306
	0-50-0	.100"	.500"	.....		25-341/5	309	655-341/5	309	656-341/5	309
	0-100	.100"	.500"	.....		25-441/5	309	655-441/5	309	656-441/5	309
	0-50-0	.100"	1.000"	.....		25-341	309	655-341	309	656-341	309
	0-100	.100"	1.000"	.....		25-441	309	655-441	309	656-441	309
	0-100	.100"	2.000"	.....		25-2041	310	655-2041	310	656-2041	310
	0-100	.100"	3.000"	.....		25-3041	310	655-3041	310	656-3041	310
	0-100	.100"	4.000"	.....		25-4041	310	655-4041	310	656-4041	310
	0-100	.100"	5.000"	.....		25-5041	310	655-5041	310	656-5041	310
	0-100	.100"	6.000"	.....		.....		.....		656-6041	311
	0-100	.100"	7.000"	.....		.....		.....		656-7041	311
	0-100	.100"	8.000"	.....		.....		.....		656-8041	311
	0-100	.100"	9.000"	.....		.....		.....		656-9041	311
	0-100	.100"	10.000"	.....		.....		.....		656-10041	311
	0-100	.100"	11.000"	.....		.....		.....		656-11041	311
	0-100	.100"	12.000"	.....		.....		.....		656-12041	311
				METRIC READING *Yellow Dials Furnished as Standard*							
0.002 mm	0-10-0	0.2 mm	0.5 mm	81-161	297	25-161	300	655-161	303	656-161	306
	0-20	0.2 mm	0.5 mm	81-261	297	25-261	300	655-261	303	656-261	306
0.01 mm	0-50-0	1 mm	2.5 mm	81-181	297	25-181	300	655-181	303	656-181	306
	0-100	1 mm	2.5 mm	81-281	297	25-281	300	655-281	303	656-281	306
	0-50-0	1 mm	10 mm	.....		25-381	309	.....		.....	
	0-100	1 mm	10 mm	.....		25-481	309	.....		.....	
	0-50-0	1 mm	25 mm	.....		25-781	309	.....		.....	
	0-100	1 mm	25 mm	.....		25-881	309	655-881	309	656-881	309
	0-100	1 mm	50 mm	.....		25-2081	312	655-2081	312	.....	
	0-100	1 mm	75 mm	.....		25-3081	312	655-3081	312	.....	
	0-100	1 mm	100 mm	.....		25-4081	312	655-4081	312	.....	
	0-100	1 mm	125 mm	.....		25-5081	312	655-5081	312	.....	

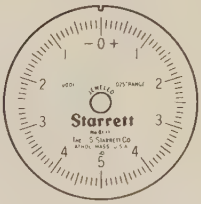
Series 81 Dial Indicators

1-11/16" Diameter, AGD Group 1

SHOCKLESS HARDENED STEEL GEAR TRAIN



Furnished with lug-on-center back and jewel bearings. Anti-magnetic mechanism can be furnished when specified. Special nonshock mechanism available on all models. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features—pages, 292, 293.



No. 81-111

No. 81-124

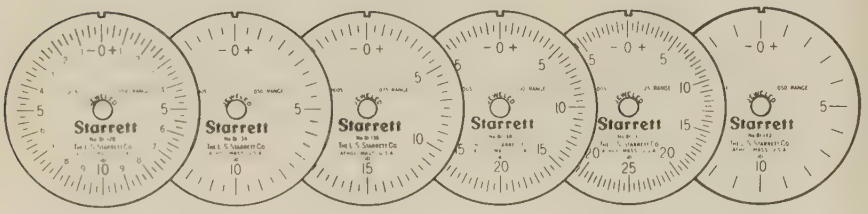
Specifications

Graduation	Dial Reading	Range		Jewel Bearings	
		One Rev.	Total	Cat. No.	EDP No.
ENGLISH READING					
.0001"	0-5-0 0-10	.010"	.025"	81-111J 81-211J	53378 53414
.00025"	0-5-0 0-10	.010"	.025"	81-124J 81-224J	53384 53416
	0-10-0 0-20	.020"	.050"	81-128J 81-228J	53386 53418
.0005"	0-10-0 0-20	.020"	.050"	81-134J 81-234J	53390 53422
	0-15-0 0-30	.030"	.075"	81-136J 81-236J	53392 53424
	0-20-0 0-40	.040"	.100"	81-138J 81-238J	53398 53426
	0-25-0 0-50	.050"	.125"	81-131J 81-231J	53388 53420
.001"	0-10-0 0-20	.020"	.050"	81-142J 81-242J	53402 53430
	0-15-0 0-30	.030"	.075"	81-143J 81-243J	53404 53432
	0-20-0 0-40	.040"	.100"	81-144J 81-244J	53408 53434
	0-25-0 0-50	.050"	.125"	81-145J 81-245J	53410 53436
	0-50-0 0-100	.100"	.250"	81-141J 81-241J	53400 53428
METRIC READING					
0.002 mm	0-10-0 0-20	0.2 mm	0.5 mm	81-161J 81-261J	56043 56045
0.01 mm	0-50-0 0-100	1.0 mm	2.5 mm	81-181J 81-281J	53412 53438

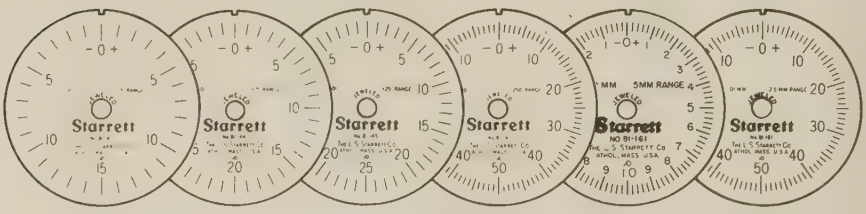
Packed one in a box.

Series 81 Dial Indicators

1-11/16" Diameter, AGD Group 1

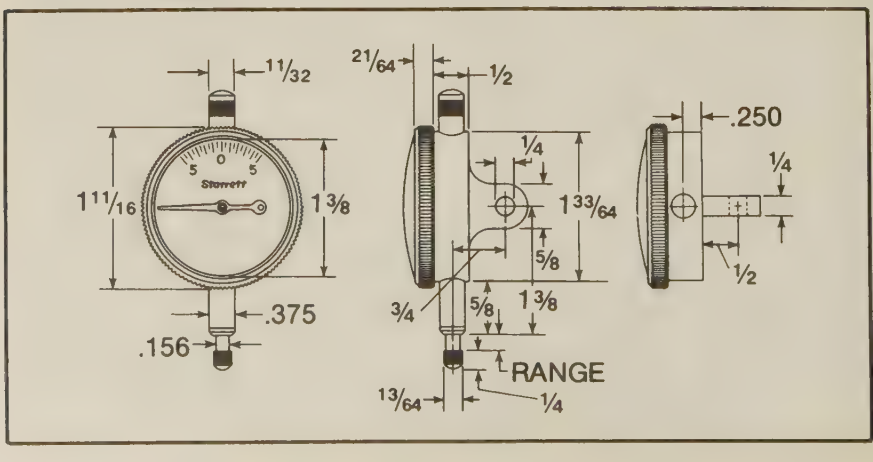


No. 81-128 No. 81-134 No. 81-136 No. 81-138 No. 81-131 No. 81-142



No. 81-143 No. 81-144 No. 81-145 No. 81-141 No. 81-161 No. 81-181

Free drafting template available for this size. Write the L. S. Starrett Co., Athol, MA 01331

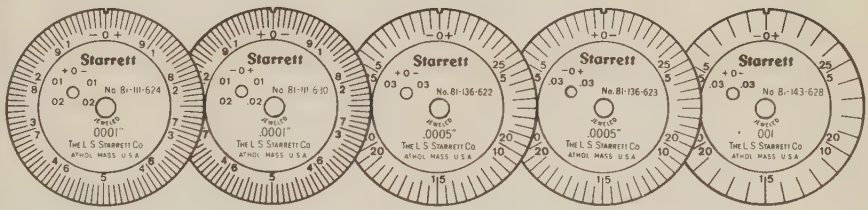


Series 81 Dial Indicators

1-11/16" Diameter

with Double Row Figures

SHOCKLESS HARDENED STEEL GEAR TRAIN



Specifications

Graduation	Dial Reading	Figures		Range		Jewel Bearings	
		Direction	Color	One Rev.	Total	Cat. No.	EDP No.
.0001"	+0-10	Clockwise	Black	.010"	.025"	81-111-624J	53380
	−0-10	Counter Clockwise	Red				
.0001"	+0-10	Counter Clockwise	Black	.010"	.025"	81-111-630J	53382
	−0-10	Clockwise	Red				
.0005"	+0-30	Clockwise	Black	.030"	.075"	81-136-622J	53394
	−0-30	Counter Clockwise	Red				
.0005"	+0-30	Counter Clockwise	Black	.030"	.075"	81-136-623J	53396
	−0-30	Clockwise	Red				
.001"	+0-30	Clockwise	Black	.030"	.075"	81-143-628J	53406
	−0-30	Counter Clockwise	Red				

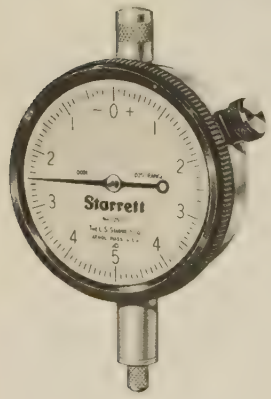
NOTE: other models with double row figures can be furnished in Series 81 and 25 dial indicators at extra charge. Anti-magnetic mechanism can be furnished when specified. Indicators with double row of figures not available with special nonshock mechanism.

Packed one in a box.

Series 25 Dial Indicators

2¼" Diameter, AGD Group 2

SHOCKLESS HARDENED STEEL GEAR TRAIN



Furnished with lug-on-center back and jewel bearings.

No. 25-106J Dial Master has an accuracy of ±.00001" for total .003" range (½ turn), the ultimate in mechanical indicator design.

Nos. 25-109J and 25-209J have an accuracy of ±.00005" for total .015" range (2½ turns).

Indicators marked with an asterisk (*) conform to AGD specifications except for range.

Anti-magnetic mechanism furnished when specified. Special nonshock mechanism available on all models except Nos. 25-106, 25-109, 25-209 and 25-116. Other backs, contact points, attachments and accessories—pages 313-320. Design, construction features—pages 292, 293.

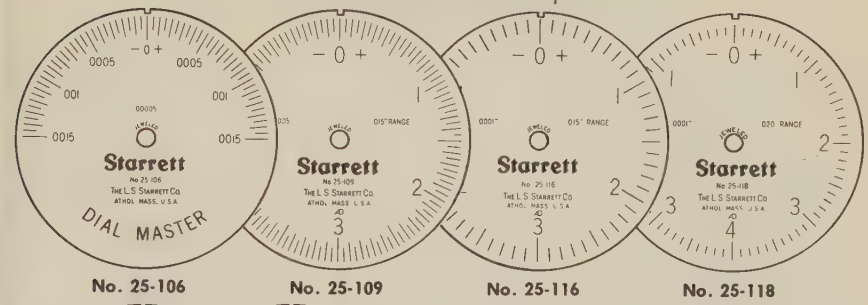
Specifications

Graduation	Dial Reading	Range		Jewel Bearings	
		One Rev.	Total	Cat. No.	EDP No.
ENGLISH READING					
.00005"	.0015- 0-.0015	—	.003"	25-106J Dial Master	53221
	0-3-0 0-6	.006"	.015"	25-109J 25-209J	53222 53254
.0001"	0-3-0	.006"	.015"	25-116J	53225
	0-4-0 0-8	.008"	.020"	25-118J 25-218J	53226 53257
	0-5-0 0-10	.010"	.025"	25-111J 25-211J	53223 53255
	0-5-0 0-10	.010"	.200"	*25-511J *25-611J	53299 53301
.00025"	0-5-0 0-10	.010"	.025"	25-124J 25-224J	53228 53259
	0-10-0 0-20	.020"	.050"	25-128J 25-228J	53230 53261
.0005"	0-10-0 0-20	.020"	.050"	25-134J 25-234J	53234 53265
	0-15-0 0-30	.030"	.075"	25-136J 25-236J	53236 53267
	0-20-0 0-40	.040"	.100"	25-138J 25-238J	53238 53269
	0-25-0 0-50	.050"	.125"	25-131J 25-231J	53232 53263
.001"	0-10-0 0-20	.020"	.050"	25-142J 25-242J	53242 53273
	0-15-0 0-30	.030"	.075"	25-143J 25-243J	53244 53275
	0-20-0 0-40	.040"	.100"	25-144J 25-244J	53246 53277
	0-25-0 0-50	.050"	.125"	25-145J 25-245J	53248 53279
	0-50-0 0-100	.100"	.250"	25-141J 25-241J	53240 53271
METRIC READING					
0.002 mm	0-10-0 0-20	0.2 mm	0.5 mm	25-161J 25-261J	53250 53281
0.01 mm	0-50-0 0-100	1.0 mm	2.5 mm	25-181J 25-281J	53252 53283

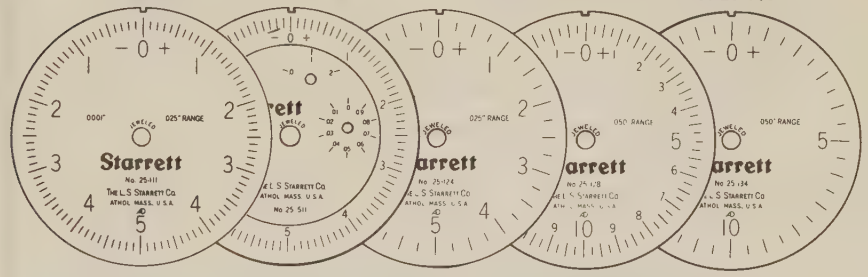
Packed one in a box.

Series 25 Dial Indicators—Cont.

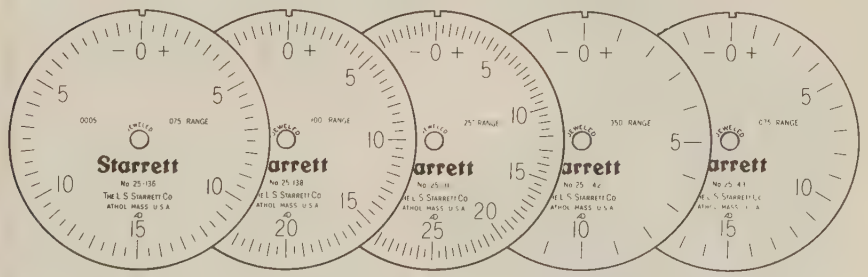
2¼" Diameter, AGD Group 2



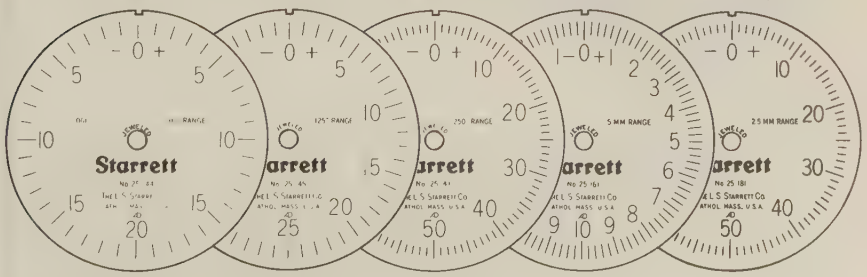
No. 25-106 **No. 25-109** **No. 25-116** **No. 25-118**



No. 25-111 **No. 25-511** **No. 25-124** **No. 25-128** **No. 25-134**



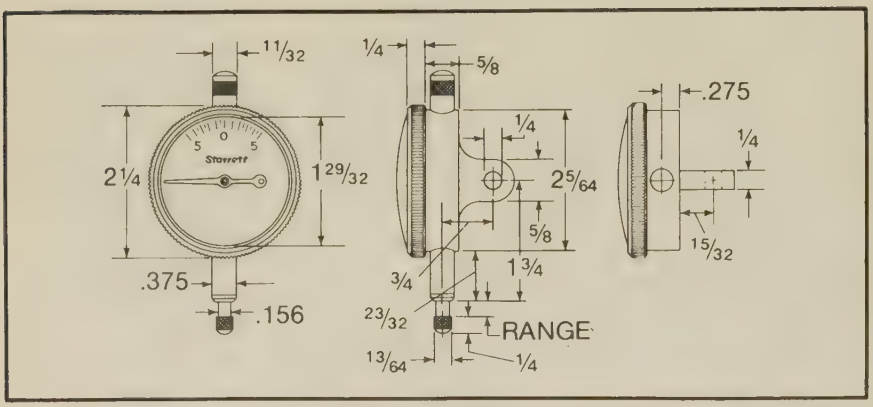
No. 25-136 **No. 25-138** **No. 25-131** **No. 25-142** **No. 25-143**



No. 25-144 **No. 25-145** **No. 25-141** **No. 25-161** **No. 25-181**

Series 25 Dial Indicators—Cont.

2¼" Diameter
AGD Group 2



Free drafting template available for this size. Write the L. S. Starrett Co., Athol, MA 01331

Dial Indicator Set No. S253Z English Reading No. S253MZ Metric Reading

Provides in one handy, compact kit three Series 25 dial indicators to handle most gaging jobs at minimum cost. Ideal for tool and die shops, machine shops and toolrooms having occasional work where a heavy investment in dial indicators would not be practical. The indicators are furnished with jewel bearings.

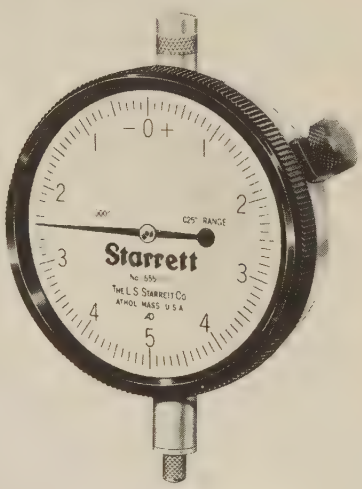
Cat. No.	EDP No.	Description
S253Z	51218	Set of 3 dial indicators in attractive, protective case: No. 25-111J (graduation .0001", dial reading 0-5-0, range .025"); No. 25-131J (graduation .0005", dial reading 0-25-0, range .125"); and No. 25-441J (graduation .001", dial reading 0-100, range 1.000")
S253MZ	56283	Set of 3 metric dial indicators in attractive, protective case: No. 25-161J (graduation 0.002 mm, dial reading 0-10-0, range 0.5 mm); No. 25-181J (graduation 0.01 mm, dial reading 0-50-0, range 2.5 mm); and No. 25-881J (graduation 0.01 mm, dial reading 0-100, range 25 mm)

Packed one set in a box.

Series 655 Dial Indicators

2¾" Diameter, AGD Group 3

SHOCKLESS HARDENED STEEL GEAR TRAIN



Furnished with lug-on-center back and jewel bearings.

Indicators marked with an asterisk (*) conform to AGD specifications except for range.

Anti-magnetic mechanism can be furnished when specified. Special nonshock mechanism available on all models. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features—pages 292, 293.

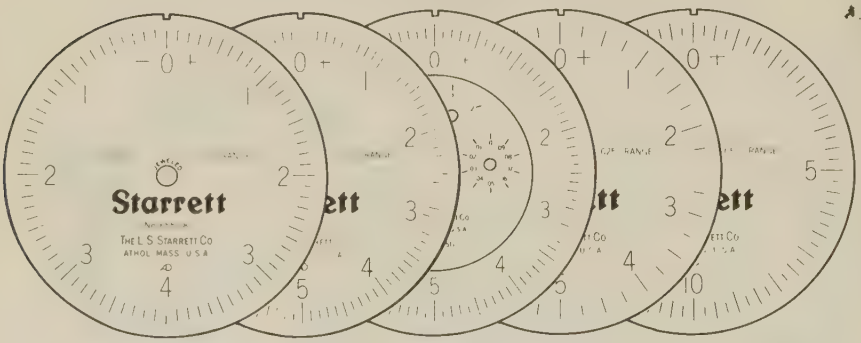
Specifications

Graduation	Dial Reading	Range		Jewel Bearings	
		One Rev.	Total	Cat. No.	EDP No.
ENGLISH READING					
.0001"	0-4-0	.008"	.020"	655-118J	53507
	0-5-0 0-10	.010"	.025"	655-111J 655-211J	53505 53537
	0-5-0 0-10	.010"	.200"	*655-511J *655-611J	53615 53617
.00025"	0-5-0 0-10	.010"	.025"	655-124J 655-224J	53509 53539
	0-10-0 0-20	.020"	.050"	655-128J 655-228J	53511 53541
	0-15-0 0-30	.030"	.075"	655-129J 655-229J	53513 53543
.0005"	0-10-0 0-20	.020"	.050"	655-134J 655-234J	53517 53587
	0-15-0 0-30	.030"	.075"	655-136J 655-236J	53519 53589
	0-20-0 0-40	.040"	.100"	655-138J 655-238J	53521 53591
	0-25-0 0-50	.050"	.125"	655-131J 655-231J	53515 53585
.001"	0-10-0 0-20	.020"	.050"	655-142J 655-242J	53525 53595
	0-15-0 0-30	.030"	.075"	655-143J 655-243J	53527 53597
	0-20-0 0-40	.040"	.100"	655-144J 655-244J	53529 53599
	0-25-0 0-50	.050"	.125"	655-145J 655-245J	53531 53601
	0-50-0 0-100	.100"	.250"	655-141J 655-241J	53523 53593
METRIC READING					
0.002 mm	0-10-0 0-20	0.2 mm	0.5 mm	655-161J 655-261J	53533 53603
0.01 mm	0-50-0 0-100	1.0 mm	2.5 mm	655-181J 655-281J	53535 53605

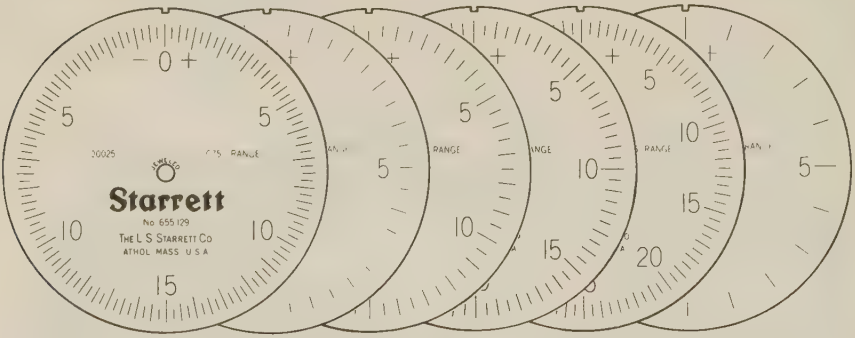
Packed one in a box.

Series 655 Dial Indicators—Cont.

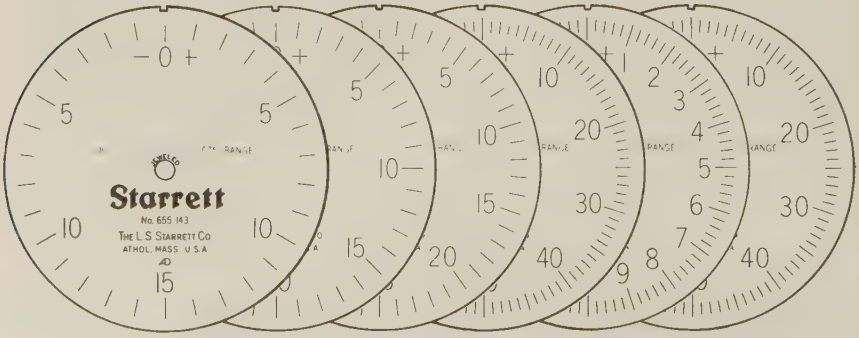
2¾" Diameter, AGD Group 3



No. 655-118 **No. 655-111** **No. 655-511** **No. 655-124** **No. 655-128**



No. 655-129 **No. 655-134** **No. 655-136** **No. 655-138** **No. 655-131** **No. 655-142**

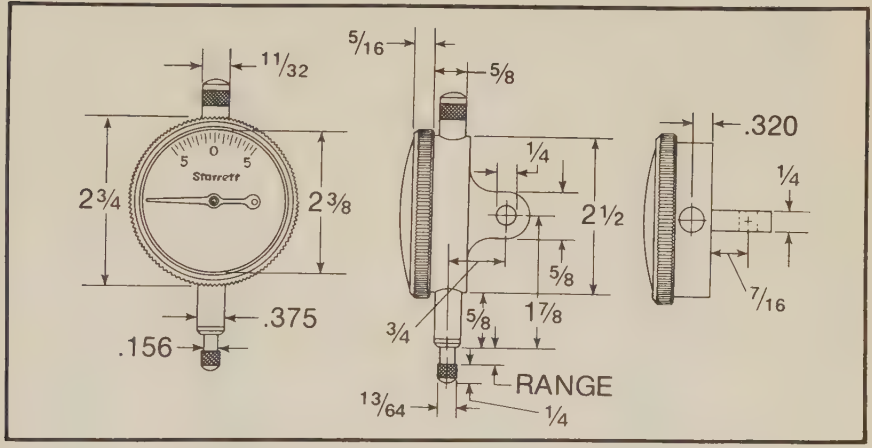


No. 655-143 **No. 655-144** **No. 655-145** **No. 655-141** **No. 655-161 (Metric)** **No. 655-181 (Metric)**

Series 655 Dial Indicators—Cont.

2¾" Diameter, AGD Group 3

Free drafting template available for this size. Write the L. S. Starrett Co., Athol, MA 01331



Dimensions for No. 655 Dial Indicators on previous pages.

Series 656 Dial Indicators

3-5/8" Diameter, AGD Group 4

SHOCKLESS HARDENED STEEL GEAR TRAIN

Furnished with lug-on-center back and jewel bearings.

Indicators marked with an asterisk (*) in the table, next page, conform to AGD specifications except for range.

Anti-magnetic mechanism can be furnished when specified. Special nonshock mechanism available on all models except Nos. 656-109 and 656-209. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features—pages 292, 293.

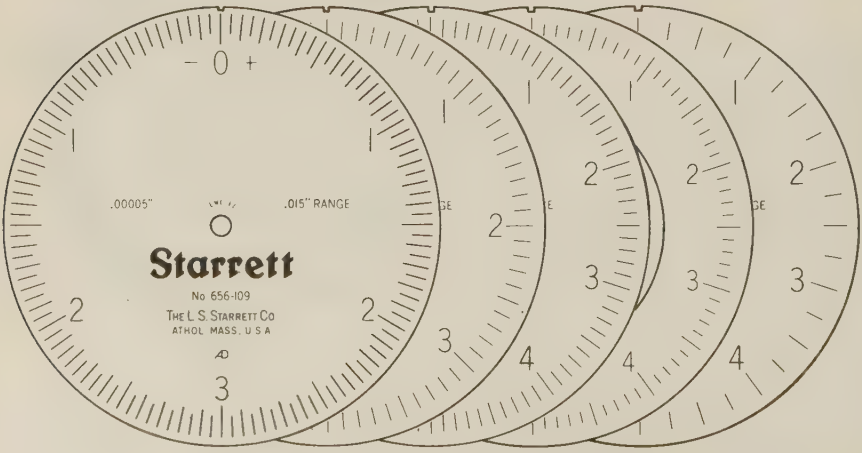
Continued next page

Series 656 Dial Indicators—Cont.

3-5/8" Diameter, AGD Group 4

Graduation	Dial Reading	Range		Jewel Bearings	
		One Rev.	Total	Cat. No.	EDP No.
ENGLISH READING					
.00005"	0-3-0 0-6	.006"	.015"	656-109J 656-209J	53661 53694
.0001"	0-4-0	.008"	.020"	656-118J	53664
	0-5-0 0-10	.010"	.025"	656-111J 656-211J	53662 53695
	0-5-0 0-10	.010"	.200"	*656-511J *656-611J	53791 53795
.00025"	0-5-0 0-10	.010"	.025"	656-124J 656-224J	53666 53697
	0-10-0 0-20	.020"	.050"	656-128J 656-228J	53668 53699
	0-15-0 0-30	.030"	.075"	656-129J 656-229J	53670 53701
.0005"	0-10-0 0-20	.020"	.050"	656-134J 656-234J	53674 53705
	0-15-0 0-30	.030"	.075"	656-136J 656-236J	53676 53707
	0-20-0 0-40	.040"	.100"	656-138J 656-238J	53678 53709
	0-25-0 0-50	.050"	.125"	656-131J 656-231J	53672 53703
.001"	0-10-0 0-20	.020"	.050"	656-142J 656-242J	53682 53713
	0-15-0 0-30	.030"	.075"	656-143J 656-243J	53684 53715
	0-20-0 0-40	.040"	.100"	656-144J 656-244J	53686 53717
	0-25-0 0-50	.050"	.125"	656-145J 656-245J	53688 53719
	0-50-0 0-100	.100"	.250"	656-141J 656-241J	53680 53711
METRIC READING					
0.002 mm	0-10-0 0-20	0.2 mm	0.5 mm	656-161J 656-261J	56690 56779
0.01 mm	0-50-0 0-100	1.0 mm	2.5 mm	656-181J 656-281J	53692 53781

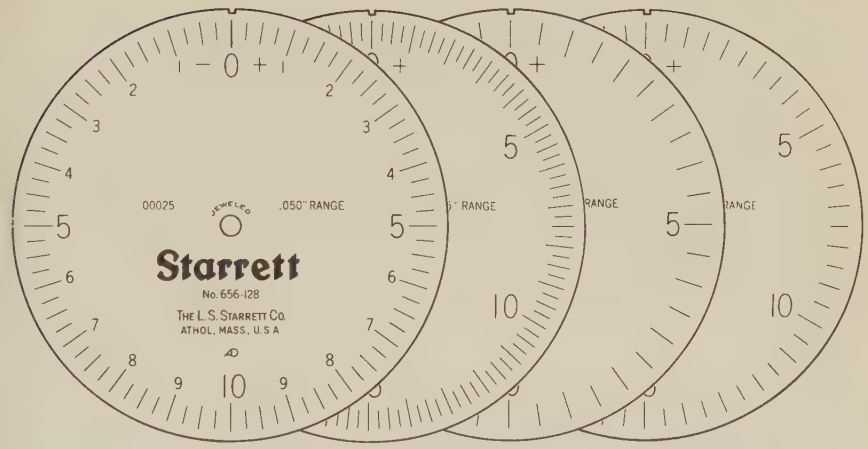
Packed one in a box.



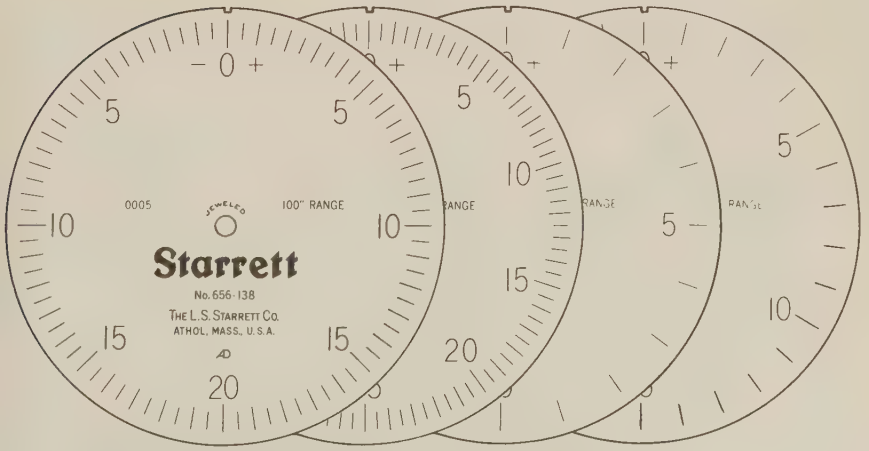
No. 656-109 No. 656-118 No. 656-111 No. 656-511 No. 656-124

Series 656 Dial Indicators—Cont.

3-5/8" Diameter
AGD Group 4



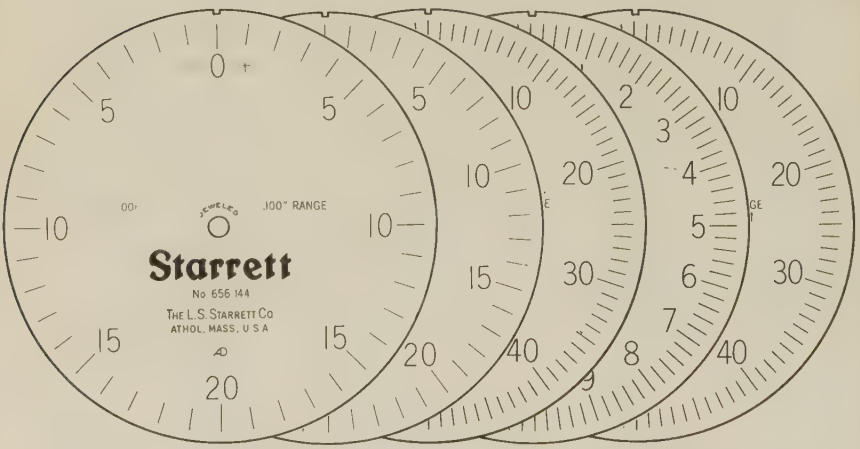
No. 656-128 **No. 656-129** **No. 656-134** **No. 656-136**



No. 656-138 **No. 656-131** **No. 656-142** **No. 656-143**

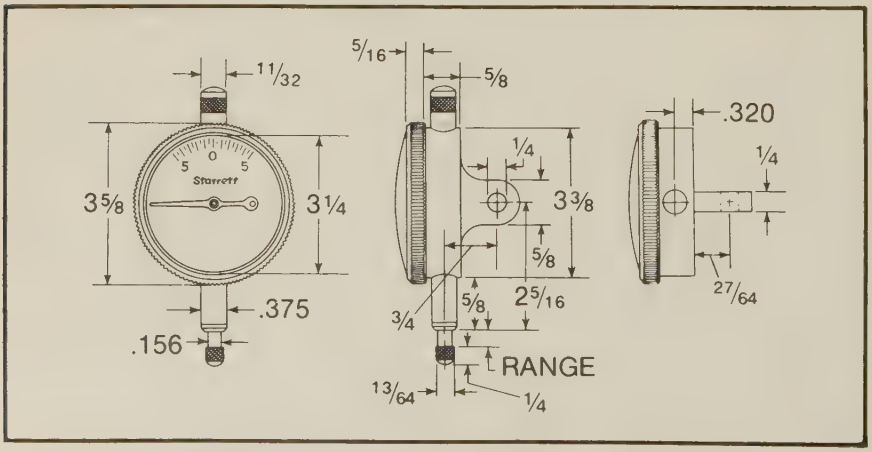
Series 656 Dial Indicators—Cont.

3-5/8" Diameter
AGD Group 4



No. 656-144 **No. 656-145** **No. 656-141** **No. 656-161 (Metric)** **No. 656-181 (Metric)**

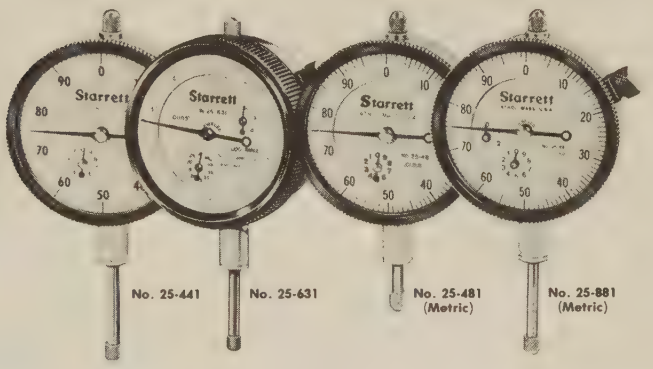
Free drafting template available for this size. Write the L. S. Starrett Co., Athol, MA 01331



Intermediate Range Dial Indicators, Series 25, 655, 656

SHOCKLESS HARDENED STEEL GEAR TRAIN

Ranges .400", .500", 1.000"; 10 mm and 25 mm (Metric)



Conform to AGD specifications except for range. Furnished with balanced or continuous reading double dial and count hand; with top lift and lug-on-center back; and with plain or jewel bearings—sent with jewel bearings unless otherwise ordered. .500", 1.000", 10 mm and 25 mm range indicators available with stem cap in place of top lift (specify); also with nonshock mechanism.

Specifications

Graduation	Dial Reading	Range		No. 25 Series		No. 655 Series		No. 656 Series	
		One Rev.	Total	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
JEWEL BEARINGS									
.0001"	0-10-0	.020"	.400"	—	—	—	—	656-517J	53793
	0-20			—	—	—	—	656-617J	53797
.0005"	0-50	.050"	.500"	25-431J	53292	—	—	—	—
	0-50		1.000"	25-631J	53304	—	—	—	—
.001"	0-50-0	.100"	.500"	25-341/5J	53285	655-341/5J	53607	656-341/5J	53783
	0-100			25-441/5J	53293	655-441/5J	53611	656-441/5J	53787
	0-50-0	.100"	1.000"	25-341J	53287	655-341J	53609	656-341J	53785
	0-100			25-441J	53295	655-441J	53613	656-441J	53789
0.01 mm	0-50-0	1.0 mm	10 mm	25-381J	53289	—	—	—	—
	0-100			25-481J	53297	—	—	—	—
	0-50-0	1.0 mm	25 mm	25-781J	53305	—	—	—	—
	0-100			25-881J	53307	655-881J	56229	656-881J	56234

Graduation	Dial Reading	Range		No. 25 Series	
		One Rev.	Total	Cat. No.	EDP No.
PLAIN BEARINGS					
.001"	0-50-0	.100"	.500"	25-341/5P	53286
	0-100			25-441/5P	53294
	0-50-0	.100"	1.000"	25-341P	53288
	0-100			25-441P	53296

NOTE: anti-magnetic mechanism can be furnished when specified. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features—pages 292, 293.

Packed one in a box.

Long Range Dial Indicators
Series 25, 655, 656

SHOCKLESS HARDENED STEEL GEAR TRAIN

Graduation .001"—Range 2.000", 3.000", 4.000", 5.000"

- ★ **Conforms to AGD specifications except for range**
- ★ **Stem cap supplied as standard—top lift available when specified**
- ★ **Furnished with continuous reading double dial with direct reading count hands**
- ★ **Furnished with jewel bearings and lug-on-center back unless otherwise ordered**

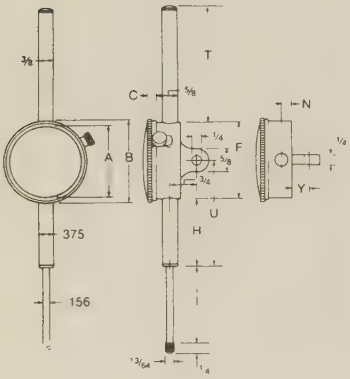
No. 25-2041

Specifications

Cat. No.	EDP No.	Range	AGD Group	Diameter	Graduation	Reading	Revs. of Hand
25-2041J	53309	2.000"	2	2 1/4"	.001"	0-100	20
655-2041J	53619	2.000"	3	2 3/4"	.001"	0-100	20
656-2041J	53799	2.000"	4	3 5/8"	.001"	0-100	20
25-3041J	53310	3.000"	2	2 1/4"	.001"	0-100	30
655-3041J	53620	3.000"	3	2 3/4"	.001"	0-100	30
656-3041J	53800	3.000"	4	3 5/8"	.001"	0-100	30
25-4041J	53311	4.000"	2	2 1/4"	.001"	0-100	40
655-4041J	53621	4.000"	3	2 3/4"	.001"	0-100	40
656-4041J	53801	4.000"	4	3 5/8"	.001"	0-100	40
25-5041J	53312	5.000"	2	2 1/4"	.001"	0-100	50
655-5041J	53622	5.000"	3	2 3/4"	.001"	0-100	50
656-5041J	53802	5.000"	4	3 5/8"	.001"	0-100	50

NOTE: not available with anti-magnetic or special nonshock mechanism. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features—pages 292, 293.

Packed one in a box.



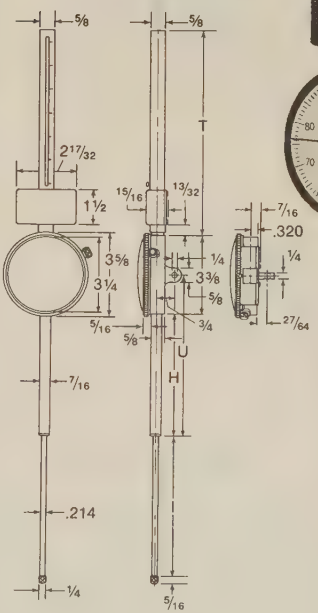
Cat. No.	A	B	C	F	H	I	N	T	U	Y
25-2041J	1 29/32	2 1/4	1/4	2 1/16	1 13/16	2 1/16	.275	3 3/32	2 55/64	15/32
655-2041J	2 3/8	2 3/4	5/16	2 1/2	1 5/8	2 1/16	.320	3 3/32	2 57/64	7/16
656-2041J	3 1/4	3 5/8	5/16	3 5/8	1 1/4	2 1/16	.320	3 3/32	2 61/64	27/64
25-3041J	1 29/32	2 1/4	1/4	2 1/16	2 13/16	3 1/16	.275	4 5/16	3 55/64	15/32
655-3041J	2 3/8	2 3/4	5/16	2 1/2	2 3/4	3 1/16	.320	4 5/16	3 57/64	7/16
656-3041J	3 1/4	3 5/8	5/16	3 5/8	2 1/4	3 1/16	.320	4 5/16	3 61/64	27/64
25-4041J	1 29/32	2 1/4	1/4	2 1/16	3 13/16	4 1/16	.275	5 41/64	4 55/64	15/32
655-4041J	2 3/8	2 3/4	5/16	2 1/2	3 3/4	4 1/16	.320	5 41/64	4 57/64	7/16
656-4041J	3 1/4	3 5/8	5/16	3 5/8	3 1/4	4 1/16	.320	5 41/64	4 61/64	27/64
25-5041J	1 29/32	2 1/4	1/4	2 1/16	4 13/16	5 1/16	.275	7 1/4	5 55/64	15/32
655-5041J	2 3/8	2 3/4	5/16	2 1/2	4 5/8	5 1/16	.320	7 1/4	5 57/64	7/16
656-5041J	3 1/4	3 5/8	5/16	3 5/8	4 1/4	5 1/16	.320	7 1/4	5 61/64	27/64

Long Range Dial Indicators
Series 656
3-5/8" Diameter
SHOCKLESS HARDENED STEEL GEAR TRAIN

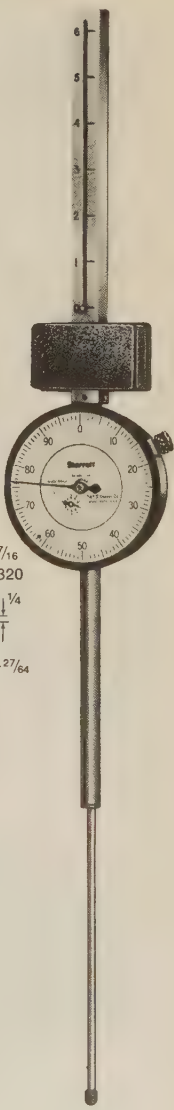
Graduation .001"—Range 6.000", 7.000", 8.000", 9.000", 10.000", 11.000", 12.000"

- ★ Conform to AGD specifications except for range, stems and contact point
- ★ Top stem graduated in 1" increments, called out by red colored pointer
- ★ Furnished with continuous reading double dial with direct reading count hand
- ★ Furnished with jewel bearings and lug-on-center back unless otherwise ordered
- ★ Hardened rack, pinions and gears resist mechanical shock and wear

NOTE: not available with anti-magnetic or special nonshock mechanism. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features—pages 292, 293.



Cat. No.	H	I	T	U
656-6041J	5 1/4	6 1/16	8 3/4	6 15/16
656-7041J	6 1/4	7 1/16	9 3/4	7 15/16
656-8041J	7 1/4	8 1/16	10 3/4	8 15/16
656-9041J	8 1/4	9 1/16	11 3/4	9 15/16
656-10041J	9 1/4	10 1/16	12 3/4	10 15/16
656-11041J	10 1/4	11 1/16	13 3/4	11 15/16
656-12041J	11 1/4	12 1/16	14 3/4	12 15/16



No. 656-6041

Specifications

Cat. No.	EDP No.	Range	AGD Group	Diameter	Graduation	Reading	Revs. of Hand
656-6041J	53803	6.000"	4	3 5/8"	.001"	0-100	60
656-7041J	53804	7.000"	4	3 5/8"	.001"	0-100	70
656-8041J	53805	8.000"	4	3 5/8"	.001"	0-100	80
656-9041J	53806	9.000"	4	3 5/8"	.001"	0-100	90
656-10041J	53807	10.000"	4	3 5/8"	.001"	0-100	100
656-11041J	53808	11.000"	4	3 5/8"	.001"	0-100	110
656-12041J	53809	12.000"	4	3 5/8"	.001"	0-100	120

Packed one in a box.

Metric Long Range Dial Indicators
Series 25, 655
SHOCKLESS HARDENED STEEL GEAR TRAIN

Graduation 0.01 mm (Metric)
Range 50 mm, 75 mm, 100 mm, 125 mm

- ★ **Conforms to AGD specifications except for range**
- ★ **Furnished with continuous reading double dial**
- ★ **Direct readout accomplished by (1) graduated top tube which indicates each 10 mm of spindle travel (2) revolution counter which indicates each 1 mm full turn of indicator hand and (3) indicator hand which shows each 0.01 mm of spindle movement**
- ★ **Furnished with jewel bearings and lug-on-center back unless otherwise ordered**

NOTE: not available with antimagnetic or special nonshock mechanism. Other backs, contact points, attachments and accessories—pages 313-320. Design and construction features —pages 292, 293.

No. 25-5081

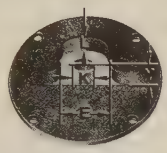
Specifications

Cat. No.	EDP No.	Range	AGD Group	Diameter	Graduation	Reading	Revs. of Hand
25-2081J	56225	50 mm	2	2¼"	0.01 mm	0-100	50
655-2081J	56230	50 mm	3	2¾"	0.01 mm	0-100	50
25-3081J	56226	75 mm	2	2¼"	0.01 mm	0-100	75
655-3081J	56231	75 mm	3	2¾"	0.01 mm	0-100	75
25-4081J	56227	100 mm	2	2¼"	0.01 mm	0-100	100
655-4081J	56232	100 mm	3	2¾"	0.01 mm	0-100	100
25-5081J	56228	125 mm	2	2¼"	0.01 mm	0-100	125
655-5081J	56233	125 mm	3	2¾"	0.01 mm	0-100	125

Packed one in a box.

Dial Indicator Backs

BACK Lug on Center

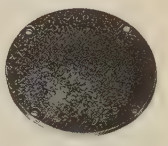


Regularly furnished on all dial indicators at no extra charge.

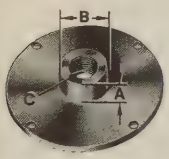
BACK Lug off Center

When specified, available on all dial indicators at no extra charge.

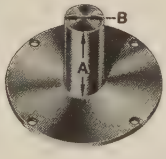
FLAT BACK



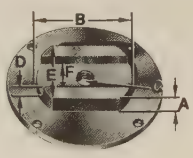
When specified, available on all dial indicators at no extra charge.



BACK Screw Type Lug



BACK Post Type Lug



BACK Adjustable Bracket

When specified, available at extra charge on all dial indicators.

Type	Fits Indicator Series No.	Part No.	EDP No.	Dimensions								
				A	B	C	D	E	F	K	L	Y
Regular (Lug-On-Center)	81	6836-1	70856	—	—	—	—	5/8"	—	1/4"	1/4"	1/2"
	25	7206-1	70960	—	—	—	—	5/8"	—	1/4"	1/4"	15/32"
	655	6966-1	70888	—	—	—	—	5/8"	—	1/4"	1/4"	7/16"
	656	7317-1	70980	—	—	—	—	3/8"	—	1/4"	1/4"	27/64"
Offset (Lug-Off-Center)	81	6836	70855	—	—	—	—	5/8"	—	1/4"	1/4"	1/2"
	25	6608-1	70770	—	—	—	—	5/8"	—	1/4"	1/4"	15/32"
	655	6966A	71996	—	—	—	—	5/8"	—	1/4"	1/4"	7/16"
	656	7317A	71997	—	—	—	—	5/8"	—	1/4"	1/4"	27/64"
Flat	81	6836J	70858	—	—	—	—	—	—	—	—	—
	25	6608J	70774	—	—	—	—	—	—	—	—	—
	655	6878J	70873	—	—	—	—	—	—	—	—	—
	656	6903J	71995	—	—	—	—	—	—	—	—	—
Screw Type Lug (1/2" Lug Diameter)	81	6836P	70860	1/2"	1/2"	1/4-28	—	—	—	—	—	—
	25	6608D	70771	1/2"	1/2"	1/4-28	—	—	—	—	—	—
	655	6878D	70872	1/2"	1/2"	1/4-28	—	—	—	—	—	—
	656	6903D	71993	1/2"	1/2"	1/4-28	—	—	—	—	—	—
Screw Type Lug (5/8" Lug Diameter)	81	6836S	72223	1/2"	5/8"	3/8-24	—	—	—	—	—	—
	25	6608E	70772	1/2"	5/8"	3/8-24	—	—	—	—	—	—
	655	6878E	72224	1/2"	5/8"	3/8-24	—	—	—	—	—	—
	656	6903E	72225	1/2"	5/8"	3/8-24	—	—	—	—	—	—
Screw Type Lug (5/8" Lug Diameter)	81	6836K	72226	3/8"	5/8"	3/8-24	—	—	—	—	—	—
	25	6608K	70775	3/8"	5/8"	3/8-24	—	—	—	—	—	—
	655	6878K	72227	3/8"	5/8"	3/8-24	—	—	—	—	—	—
	656	6903K	72228	3/8"	5/8"	3/8-24	—	—	—	—	—	—
Post Type Lug	81	6836F	70857	1 1/4"	1/2"	—	—	—	—	—	—	—
	25	6608F	70773	1 1/4"	1/2"	—	—	—	—	—	—	—
	655	6878F	71992	1 1/4"	1/2"	—	—	—	—	—	—	—
	656	6903F	71994	1 1/4"	1/2"	—	—	—	—	—	—	—
Adjustable Bracket	81	6836M	70859	1/4"	7/8"	1/4-20	1/8"	7/8"	—	1/2"	—	—
	25	6608M	70776	1/4"	1 1/4"	1/4-20	1/8"	7/8"	—	1/2"	—	—
	655	6878M	70874	1/4"	1 1/4"	1/4-20	1/8"	7/8"	—	1/2"	—	—
	656	6903M	70882	1/4"	1 1/4"	1/4-20	1/8"	7/8"	—	1/2"	—	—

NOTE: Special backs for specific requirements also available; prices on application.

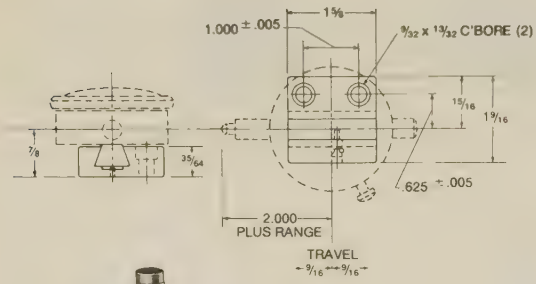
Attachments and Accessories for AGD Dial Indicators

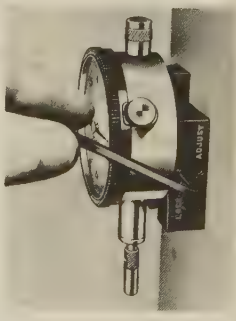
Dial Indicator Back With Adjustable Mounting Bracket No. 674 Series

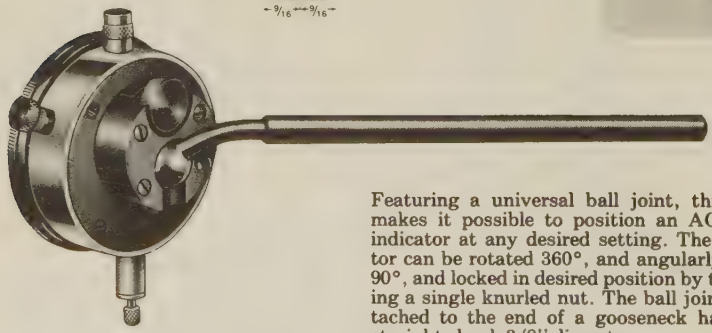
For use with gages and gaging fixtures where an adjustable indicator mounting is required. A dovetail with rack and pinion adjustment provides 1-1/8" indicator travel. A 1/8" hex wrench is used to adjust and lock the indicator in final position. The bracket has two counterbored mounting holes (for 1/4" socket head screws), and the back has four screw holes so the indicator back can be rotated.

Cat. No.	EDP No.	Description
674-2	52892	For No. 25 Series AGD Dial Indicators
674-3	52893	For No. 655 Series AGD Dial Indicators
674-4	52894	For No. 656 Series AGD Dial Indicators

Packed one in a box.

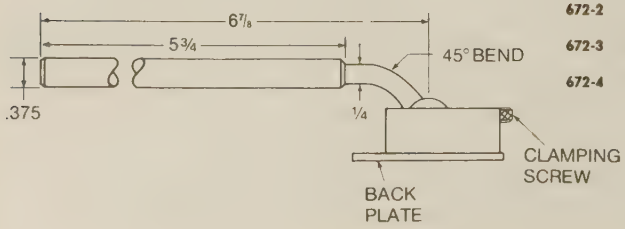






Featuring a universal ball joint, this back makes it possible to position an AGD dial indicator at any desired setting. The indicator can be rotated 360°, and angularly up to 90°, and locked in desired position by tightening a single knurled nut. The ball joint is attached to the end of a gooseneck having a straight shank 3/8" diameter.

Universal Indicator Back No. 672 Series

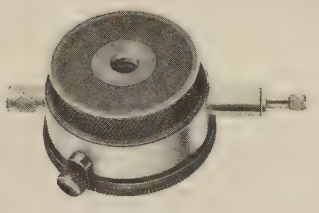


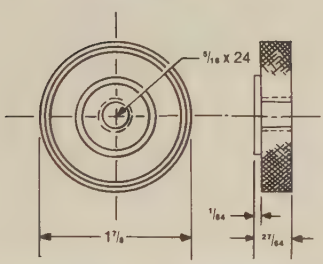
Cat. No.	EDP No.	Description
672-2	52887	For No. 25 Series AGD Dial Indicators
672-3	52888	For No. 655 Series AGD Dial Indicators
672-4	52889	For No. 656 Series AGD Dial Indicators

Packed one in a box.

Attachments and Accessories for AGD Dial Indicators

Magnetic Back for 81, 25, 655 and 656 Series Indicators
No. 676 Series





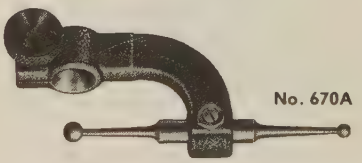
No. 676 magnetic backs provide a quick and easy means of attaching any Starrett AGD type dial indicator to flat ferrous metal surfaces. A real time saver for machine, jig and fixture set up. Requires no clamps, rods or snugs. A special 5/16"-24 threaded stud back is provided to replace the standard lug back. The powerful, permanent magnet is then attached to the threaded stud. Anti-magnetic indicators are not required.

Cat. No.	EDP No.	Fits Indicator Series
676-1	56647	81
676-2	56648	25
676-3	56649	655
676-4	56650	656

Packed one in a box.

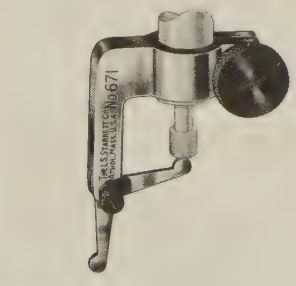
Dial Indicator Hole Attachment
No. 670 Series

These Hole Attachments used with any standard dial indicator make it possible to measure inside of holes and other surfaces that cannot be reached with the regular indicator spindle. Both attachments have a .375" diameter hole to fit all indicators made to AGD standards and are securely clamped to the indicator stem by means of a knurled screw. The ball end on the swivel arm which contacts the work is 1/8" diameter and the body of the arm is 7/32" diameter.



Cat. No.	EDP No.	For Hole Depths to:
670A	52884	13/16"
670B	52724	1-11/16"

Packed one in a box.



Universal Attachment
No. 671 (EDP No. 52886)

No. 671 Universal Attachment is for use with all standard AGD indicators having .375" stem diameter. Like No. 670A and No. 670B described above, No. 671 Universal Attachment also clamps on the indicator stem and its movement is transmitted through the contact point to the indicator. Regularly furnished with two interchangeable arms, one straight for measuring internal surfaces and one angular for measuring at right angles to the indicator spindle.

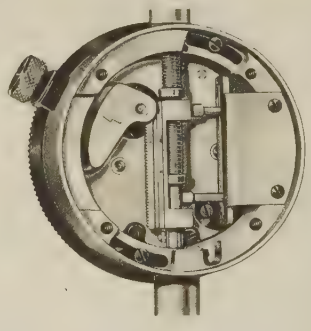
Packed one in a box.

Attachments and Accessories for AGD Dial Indicators

Starrett dial indicators have hardened, stainless steel gears, pinions and racks for maximum resistance to shock. Where the rack is subject to repeated severe and *excessive* mechanical shocks, many Starrett AGD dial indicators may be ordered with a special nonshock mechanism as shown. Based on a spring-floating rack sleeve, this simple, positive-acting device protects indicator accuracy, prolongs life and reduces service costs. In ordering, specify N/S after the dial indicator catalog number.

NOTE: not available on the following dial indicators: Nos. 81-111-624, 81-111-630, 81-136-622, 81-136-623, 81-143-628; Nos. 25-106, 25-109, 25-116, 25-209, 25-341, 25-341/5, 25-381, 25-431, 25-441, 25-441/5, 25-481, 25-631, 25-781, 25-881; Nos. 655-341, 655-441, 655-881; Nos. 656-109, 656-209 and all other dial indicators 2" range and above.

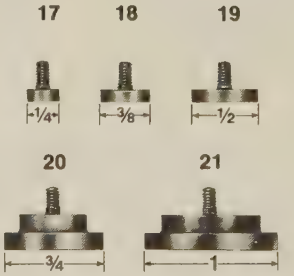
Special Nonshock Mechanism



Extra Length Contact Points

Used in place of the 1/4" long contact point furnished on Starrett AGD dial indicators. Standard lengths from 1/2" to 3" in 1/4" increments. Diameter 13/64"; #4-48 screw thread. Made from high grade steel, hardened, ground and chrome plated. Intermediate lengths available—prices on application. Also available with flat ends in standard sizes listed above.

Length	Regular—Rounded End		Regular—Flat End	
	Part No.	EDP No.	Part No.	EDP No.
1/4"	7215	70965	10453	72048
1/2"	6677	70823	9560	71260
3/4"	6677A	70824	9560A	71261
1"	6677B	70825	9560B	71262
1 1/4"	6677C	70826	9560C	71263
1 1/2"	6677D	70827	9560D	71264
1 3/4"	6677E	70828	9560E	71265
2"	6677F	70829	9560F	71266
2 1/4"	6677G	70830	9560G	71267
2 1/2"	6677H	70831	9560H	71268
2 3/4"	6677J	70832	9560J	71269
3"	6677K	70833	9560K	71270

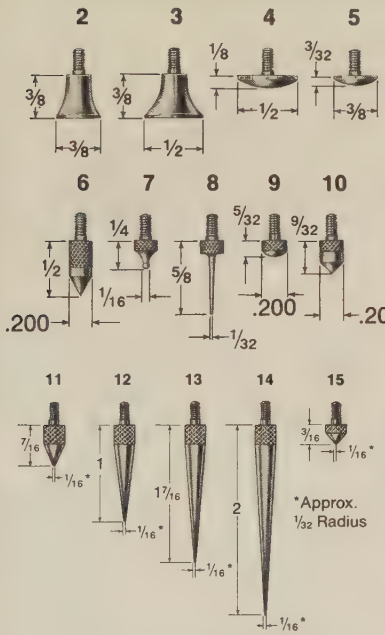


Flat-End Contact Points

Hardened contact surfaces ground flat and lapped. Standard diameters: 1/4", 3/8", 1/2", 3/4" and 1". Furnished with #4-48 screw thread for use on any AGD dial indicator. Order by numbers shown.

Diameter	Special Form No.	Part No.	EDP No.
1/4"	17	6632/17	70804
3/8"	18	6632/18	70805
1/2"	19	6632/19	70806
3/4"	20	6632/20	70808
1"	21	6632/21	70807

Attachments and Accessories for AGD Dial Indicators



Special Form Contact Points

Starrett Special Contact Points are furnished in fourteen shapes, dimensions as marked. All have #4-48 screw thread and can be used on any AGD indicator. Order by numbers shown. Other special shapes as well as points with tungsten carbide, sapphire or diamond faces made to order. Prices on request.

Special Form No.	Part No.	EDP No.
2	6632/2	70790
3	6632/3	70791
4	6632/4	70792
5	6632/5	70793
6	6632/6	70794
7	6632/7	70795
8	6632/8	70796
9	6632/9	70797
10	6632/10	70798
11	6632/11	70799
12	6632/12	70800
13	6632/13	70801
14	6632/14	70802
15	6632/15	70803

Shock Absorbing Anvil No. 28

EDP No. 50199

Replaces the regular contact point on any AGD dial indicator, protecting its movement against mechanical shock. Any sudden impact telescopes the anvil into the body of the unit against an internal spring. Acts as a solid contact point when the indicator is used normally. Furnished with #4-48 AGD standard screw thread. Also available to order with female thread to fit No. 196 series Dial Test Indicator.

Roller Contact Point No. 25W

EDP No. 53916

This contact has a small hardened roller for continuous gaging of moving material where the material movement is not too fast. #4-48 screw thread—substitutes for the regular contact point provided on Starrett and other AGD dial indicators. Furnished with a knurled check nut for positioning the contact on the indicator spindle.

Contact Point Set No. 25R

EDP No. 50153

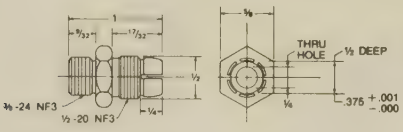
14 points with #4-48 screw thread to fit AGD dial indicators: a regular 1/4" long point; 9 special form points; a No. 28 Shock Absorbing Anvil; and 3 extra long points 1/2", 3/4" and 1" long. High grade steel, hardened, ground and chrome plated. All are mounted on a convenient aluminum ring for safe keeping and ready selection.

Packed one set in a box.

Attachments and Accessories for AGD Dial Indicators

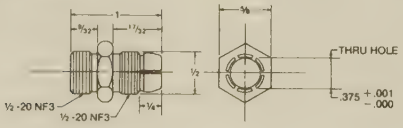
Split Collets, No. 25-SC Series

For Mounting AGD Dial Indicators (3/8" Stem) in Gaging and Work Locating Fixtures



No. 25-SC14

No. 25-SC38



These collets simplify fixture-mounting any AGD dial indicator (3/8" stem). The threaded end is screwed into a through hole in the fixture, and the indicator inserted in the collet hole and tightened in place by a hexagonal collet nut. Internal collet fingers grip the indicator at six equidistant points around its periphery, eliminating risk of spindle binding. Made of steel with attractive black finish.

Cat. No.	EDP No.	Thread Size	Thread Length	Hole for Indicator Stem
25-SC14	50155	3/8-24NF3	9/32"	.375" dia. to 1/2" depth; 1/4" dia. through hole
25-SC38	50156	1/2-20NF3	9/32"	.375" dia. through hole
25-SC38B*	55995	1/2-32UN3	9/32"	.375" dia. through hole

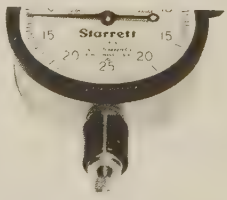
* No. 25-SC38B dimensions are the same as for No. 25-SC38 except mounting threads are 1/2-32UN3 instead of 1/2-20NF3.

Packed one in an envelope.

Threaded Stem Dial Indicators

All Starrett dial indicators with .375" diameter stem up to 1" range (except long stem models) are available at additional cost with threaded stems. A 3/8-24 thread furnished unless otherwise specified. A threaded stem is often desirable for attaching the dial indicator to machine tools or fixtures.

Split Bushing



A split bushing fits over the dial indicator stem to increase its diameter for mounting in fixtures. No. 80SB is for Series 80 Miniature Dial Indicators; No. 25SB and No. 25MSB are for English and Metric AGD Dial Indicators.

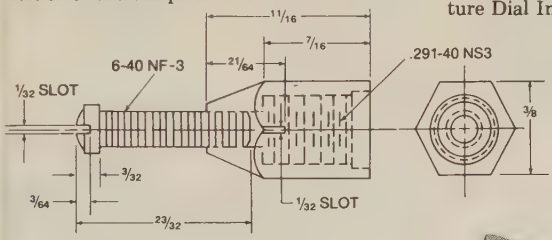
Cat. No.	EDP No.	Length	Inside Dia.	Outside Dia.
80SB	56008	1/2"	.219"	.375"
25SB	50154	1/2"	.375"	.500"
25MSB	56007	1/2"	8 mm	.375"

Attachments and Accessories for AGD Dial Indicators

Range Limit Cap No. 25LC

EDP No. 50152

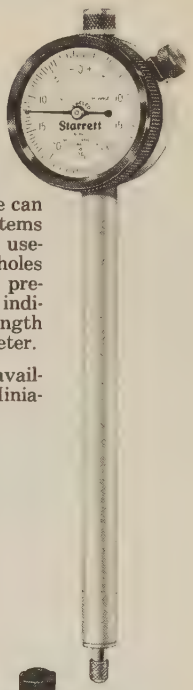
The Range Limit Cap replaces the stem cap furnished on most Starrett Series 81, 25, 655 and 656 AGD dial indicators. It can be adjusted to limit an indicator's measuring range any amount up to 3/8". Prevents possible error of a complete revolution.



Long Stem Dial Indicators

Starrett No. 81, 25, 655 and 656 Dial Indicators through 1" range can be furnished with long stems up to 12". Particularly useful for gaging in deep holes or where obstructions prevent the use of regular indicators. Specify stem length from case outside diameter.

NOTE: long stems not available on No. 80 Series Miniature Dial Indicators.



Top Lift

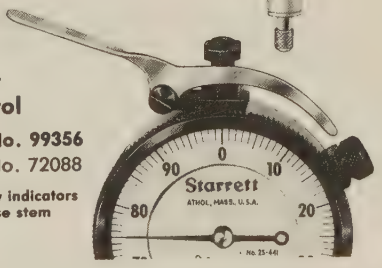
The top lift is a knurled grip with which the spindle is lifted with the fingers and returned by spring action to contact the work. Furnished in place of the stem cap on .500", 1.000", 10 mm and 25 mm long range indicators. No extra charge on AGD indicators up to 1" range; over 1" range, price on request. To order, specify "with Top Lift" after the indicator catalog number.

Lever Control

Part No. 99356

EDP No. 72088

Fits only indicators with case stem cap.



This handy attachment mounts in place of the stem cap and is interchangeable on most Starrett Series 81, 25, 655 and 656 AGD dial indicators up to 1.000" or 25 mm range. Pressing down the lever lifts the spindle; releasing it lets the spindle contact the work. Easy to install in the left or right hand position using a screwdriver and open end wrench. If ordered on a new indicator, specify left or right hand position. Furnished at left unless otherwise ordered. *NOTE: .500", 1.000", 10 mm or 25 mm indicators must be originally ordered with case stem cap to be used with cam type lifting levers.* No extra charge for case stem cap.

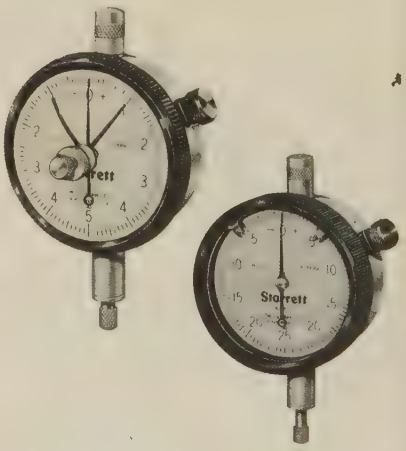
Attachments and Accessories for AGD Dial Indicators

Tolerance Hands

Starrett dial indicators may be ordered with crystal-mounted or bezel-mounted tolerance hands for visually checking the limits of any given dimension.

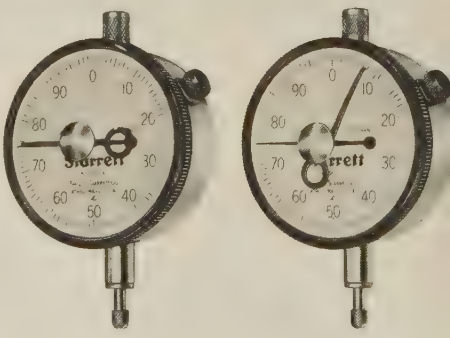
Crystal-mounted hands, both colored red, are positioned under the crystal and are individually adjustable through 360° by turning concentric knurled knobs on the outside of the crystal. Available for all Series 81, 25, 655 and 656 AGD dial indicators.

Bezel-mounted hands, both colored red, rotate inside the bezel. They are mounted outside the crystal and are independently adjustable through 360°. Available on Series 81 and 25 AGD dial indicators only.



Maximum Hand

This hand, colored red, records the maximum position reached by the indicator hand within a single revolution. Mounted under the crystal, the maximum hand has a small nib at its point. The indicator hand contacts the nib, advancing the maximum hand which remains in position when the indicator hand returns to its at-rest position. Resetting the maximum hand is done by turning the knurled knob mounted outside the crystal. Available to order.



Maximum Hand in at-rest position with indicator hand, left. In recording position, right.

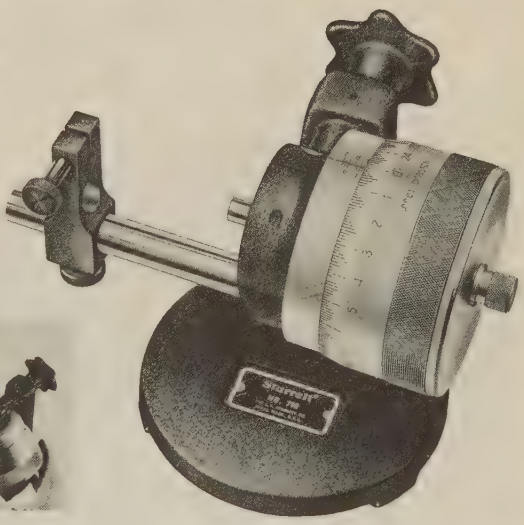
Rubber Dust Guard

Protects the spindle of AGD dial indicators from dust, fine abrasives and other foreign matter under adverse gaging conditions. Made in lengths to fit Nos. 81, 25, 655 and 656 dial indicators up to 1" range. In ordering, specify dial indicator catalog number and range.

Part No.	EDP No.	Indicator Range
9545	71256	.400", .500", 1.000"
9763	71289	Ranges under .400"

Dial Indicator Tester No. 716

Direct Reading to .0001"—For Calibrating Dial Indicators and Test Indicators



Checking AGD dial indicator (below right). Dial test indicator (left) is held in place by an offset attachment.

English or metric, this gage provides a rapid means of calibrating both AGD and dial test indicators for linearity and repeatability through ranges up to 1.0000" or 25 mm. Differing from similar indicator testers, it can be swung to any position between vertical and horizontal by loosening a large hand knob which fastens the gage assembly to the base. In addition, the micrometer head can be turned on its axis by loosening a single set screw and its scale positioned to suit the operator's convenience. Tensioned locking screws prevent tipping of both the gage assembly and indicator holding clamp during set-up and adjustment.

Indicators are mounted in the holding clamp—AGD types by the stem, dial test indicators by an offset attachment—and locked in place by a thumb screw. The holding clamp is moved along its post until the indicator contact point meets the micro-lapped spindle face of the micrometer head. Then both indicator and micrometer head are set to zero and the holding clamp locked to the post by another thumb screw.

The micrometer head thimble is rotated to bring the dial indicator hand to coincide with selected dial graduations, then read to determine plus or minus variations. Variations recorded across the entire indicator range give an accurate picture of linearity. Repeatability of reading at any dial indicator graduation is tested by rotating the micrometer head rapidly away from and back to its setting, then measuring how closely the indicator hand returns to the graduation each time.

Reading directly in ten-thousandths of an inch or thousandths of a millimeter, the Dial Indicator Tester is particularly useful in calibrating English or metric-reading indicators. It may also, however, be used to check indicators of higher magnification. Its micrometer head, 4-1/16" diameter, has widely spaced, staggered graduations on no-glare satin chrome finish.

Cat. No.	EDP No.	Micrometer Head		Description
		Graduation	Range	
716	55967	.0001"	0-1"	With offset attachment for dial test indicators
716M	57100	0.002 mm	0-25 mm	With offset attachment for dial test indicators

Packed one in a box.

Last Word® Electronic Gage Amplifier

Series 812—Meter Display

.0005" to .000005" Graduation (English)

0.01 mm to 0.0001 mm Graduation (Metric)

Ten Switch-Selected Ranges

No. 812-11 Single Gaging Head Type

No. 812-12 Double Gaging Head Type (illustrated)

NOTE: lever and cartridge type gaging heads shown on page 325.

- ★ **Single Gaging Head Model for Single Dimension Measurements**
- ★ **Double Gaging Head Model for Differential/Cumulative Measurements**
- ★ **Lever or Cartridge Type Gaging Heads**
- ★ **Easy Set-Up, Operation—All Controls on Front Panel**
- ★ **Lightweight, Portable—Use Anywhere in the Shop**

This new electronic amplifer combines high and low magnifications in a single unit. It can be used for the most sophisticated laboratory work or for in-process measurements anywhere in the shop.

Gaging Heads. No. 812-11 takes a single gaging head and measures or compares single dimensions. No. 812-12 takes two gaging heads and has the additional capability for differential and cumulative gaging. Starrett lever type or cartridge type gaging heads may be used. The lever type mounts directly in place of dial indicators with AGD lug type backs. The cartridge type has a .375" body diameter and can be substituted for any AGD dial indicator mounted by its stem. See description and mounting dimensions, page 325.

English or Metric. Both gages combine English or metric readout on a single meter with mirror dial for parallax-free readability. A green light above the range selector switch indicates that the gage is switched to English readout and a red light signals metric.

Last Word® Electronic Gage Amplifier Series 812—Meter Display Continued

Controls. No. 812-11 panel controls include a rotary on-off switch; range selector switch; gaging head polarity switch; gaging head calibration and zero-setting potentiometers. No. 812-12 has these controls in duplicate. Gaging heads are plugged into the front panel. Both models have available an analog output in the rear. In the inch system, this output swings between +1.0 and −1.0 volts corresponding to displacements of ±.01". In the metric system, the analog output swings between ±2.0 volts corresponding to displacements of ±0.2 mm.

Ranges—Graduations. The rotary range selector switch provides instant access to ten gaging ranges, five English and five metric.

Range	Each Meter Graduation
English	
±.010"	.0005"
±.002"	.0001"
±.001"	.00005"
±.0002"	.00001"
±.0001"	.000005"
Metric	
±0.200 mm	0.01 mm
±0.100 mm	0.005 mm
±0.020 mm	0.001 mm
±0.010 mm	0.0005 mm
±0.002 mm	0.0001 mm

Accuracy. The amplifier readout is a taut-band meter which eliminates the friction of springs, pivots and jewels. This, combined with solid state circuitry, results in accuracy within 2% of full scale including drift, variations in linearity, repeatability, temperature and line voltage. Stability: magnification change ±1%, zero drift ±½% over a 32°–122°F (0–50°C) range.

Portability. Electronic components are mounted on printed circuit boards inside a compact aluminum housing 8-3/8" high x 9" wide x 6" deep with handsome blue-gray finish. Weight 6 lbs., 5 oz. A carrying handle and four rubber feet are provided.

Power Source. The amplifier operates instantly without warmup. Power is obtained by plugging a 7'6" line cord (furnished) into any 115/230V, 50-60Hz AC outlet. Changing from one voltage to the other is done by moving a sliding switch on back of the housing.

Operating Instructions. Detailed operating and adjusting instructions are packed with each amplifier.

Cat. No.	EDP No.	Description	Range/Graduation	Meter Reading	
				Upper Scale	Lower Scale
812-11	56316	Amplifier with input for one gaging head	See table above	10-0-10	2-0-2
812-12	56317	Amplifier with inputs for two gaging heads	See table above	10-0-10	2-0-2
812-1Z	56314	Lever Type Gaging Head with 10 ft. cable and connector (see page 325)			
812-2Z	56315	Cartridge Type Gaging Head with 10 ft. cable and connector (see page 325)			
812-4	52991	Height Gage and Comparator Attachment (adapts gaging heads to vernier height gages, height transfer gages, etc.—see page 325)			
812-5Z	56312	Calibration Gage Block Set—two rectangular steel blocks in case: .100", .110", Federal Accuracy Grade 2: +.000004", −.000002"			

Amplifiers packed one in a box.

Gaging heads and attachment packed separately, one in a box.

Last Word® Electronic Gage Amplifier
Series 812—Digital Display

Direct Readout to .00001" (English); ±.01000" Range
Direct Readout to 0.0001 mm (Metric); ±0.2000 mm Range

No. 812-13—Single Gaging Head Type
No. 812-14—Double Gaging Head Type

- **Instant Response—Dimensions Displayed in 7/16" High Numbers**
- **Direct Reading—No Graduations to Count**
- **Shortens Inspection Time, Improves Reading Accuracy**
- **Lightweight, Portable, Easy to Set Up and Use**
- **Single and Double Gaging Head Types**
- **Lever or Cartridge Type Gaging Heads**

This unique digital gage greatly increases inspection speed in either English or metric measurement. Its response is immediate with direct reading dimensions displayed in 7/16" high numbers. Reading accuracy increases, too, because there are no graduations to count and no sighting or interpolating by eye.

No. 812-13 takes a single gaging head and measures or compares single dimensions. No. 812-14 takes two gaging heads and has the additional capability for differential and cumulative gaging. Both gages always read to five decimal places (English) or four decimal places (metric), making them equally useful in the gage laboratory or beside the machine. They accommodate Starrett lever type or cartridge type gaging heads shown next page.

Both gages have a rotary on-off switch and an English-metric selector switch. A green light indicates when the gage is switched to English readout and a red light signals metric readout. Other front-panel controls include (on No. 812-13) a gaging head polarity switch; gaging head calibration and zero-setting potentiometers. No. 812-14 has these controls in duplicate. Gaging heads are plugged into the front panel. Both models have an analog output in the rear. In the inch system, this output swings between +1.0 and −1.0 volts corresponding to displacements of ±.01". In the metric system, the analog output swings between ±2.0 volts corresponding to displacements of ±0.2 mm. The rear connector also provides a BCD output for interfacing with printers, computers, etc.

No. 812-13 and 812-14 Amplifiers have digital output using RS232-C and can be used with printers, terminals and computers. A cable assembly is available (No. 812-6) to connect the edge board output to an RS232-C standard plug with a pendant switch attached as a print command button.

Solid state circuitry results in gage accuracy within 2% of full scale including drift, repeatability, temperature and line voltage. Stability: magnification change ±1%, zero drift ±½% over a 32°–122°F (0–50°C) range. The amplifier operates instantly without warmup. Power is obtained by plugging a 7'6" line cord (furnished) into any 115/230 V, 50–60 Hz AC outlet. A sliding switch in back of the housing changes voltages.

Electronic components are mounted on printed circuit boards inside a compact aluminum housing 8-3/8" high x 9" wide x 6" deep with a handsome blue-gray finish. Weight—5 lbs., 14 oz. A carrying handle and four rubber feet are provided. Detailed operating and adjusting instructions are packed with each amplifier.

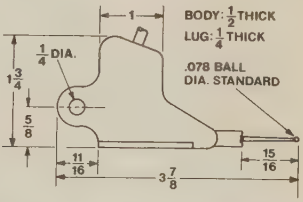
Last Word® Electronic Gage Amplifier
Series 812—Digital Display — Continued

Cat. No.	EDP No.	Description	Readout		Range	
			English	Metric	English	Metric
812-13	56318	Amplifier with input for one gaging head	.00001"	0.0001 mm	±.01000"	±0.2000 mm
812-14	56319	Amplifier with inputs for two gaging heads	.00001"	0.0001 mm	±.01000"	±0.2000 mm
812-1Z	56314	Lever Type Gaging Head with 10 ft. cable and connector				
812-2Z	56315	Cartridge Type Gaging Head with 10 ft. cable and connector				
812-4	52991	Height Gage and Comparator Attachment (adapts gaging heads to vernier height gages, height transfer gages, etc.				
812-5Z	56312	Calibration Gage Block Set—two rectangular steel blocks in case: .100", .110", Federal Accuracy Grade 2: +.000004", −.000002"				
812-6	57067	RS232-C Interface Cable Assembly with 10 ft. of cable between gage and printer/computer and 10 ft. of cable between gage and pendant print switch.				

Amplifiers packed one in a box.
Gaging heads and attachment packed separately, one in a box.

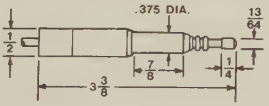
Gaging Heads for No. 812 Series Electronic Gage Amplifiers

No. 812-1Z
Lever Type Gaging Head



8-12 gram contact pressure; .014" spindle travel to zero position; .078" diameter contact (.031" and .062" diameter carbide contacts also available).

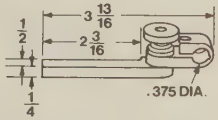
Mounts directly in place of dial indicators with AGD lug type backs. Comes with 10 ft. cable and male connector in case. Packed one in a box.



No. 812-2Z
Cartridge Type Gaging Head

20-25 gram contact pressure; .014" spindle travel to zero position; hardened steel contact with radius, same as furnished on AGD dial indicators (also available in carbide). Takes all standard AGD contact points. Mounts directly in place of AGD dial indicators held by their stems. Comes with 10 ft. cable and male connector in case. Packed one in a box.

No. 812-4
Height Gage and Comparator Attachment



Adapts Nos. 812-1 and 812-2 Gaging Heads to vernier height gages, height transfer gages, magnetic base indicator holders, dial comparators and test indicator stands. Consists of swivel snug with .375" hole and ¼" x ½" shank. Packed one in a box.

Last Word® Dial Test Indicators

No. 711FS—Graduation .001"

No. 711HS—Graduation .0005"

No. 711MFS—Graduation 0.01 mm (Metric)

- ★ **Universally adaptable to countless shop measuring jobs**
- ★ **Jeweled lever for extra smooth indicator action**
- ★ **Reversible action**
- ★ **Swiveling tubular body**
- ★ **Hard chrome plated ratchet contact point**
- ★ **With Universal Shank and case**
- ★ **With shaded dial for jig borer use**

The universal shop application of the Last Word Indicator makes it the favorite of machinists, toolmakers and inspectors. This, too, is the indicator furnished as an accessory for increasing the utility of machine tools and other kinds of mechanical equipment.

No. 711F features a jeweled lever for extra smooth indicator action, and a switch lever on the body to reverse the action. The .120" diameter ball contact point has a ratchet joint that can be readily moved to any desired position (.035" and .062" diameter ball contact points available—see page 330). The dial, which is 15/16" diameter, can be rotated for zero setting the hand. Removal of the inspection hole cover screw from the side of the indicator body makes minor adjustments possible.

No. 711FS with Universal Shank. Also available with Gooseneck Shank.

No. 711FS

SHADED DIALS

Nos. 711FS and 711HS Indicators furnished with shaded dials as shown. Shaded area is colored yellow.

No. 711HS

Cat. No.	EDP No.	Description	Graduation	Dial Reading	Range
711FSAZ	52925	Indicator with Universal Shank in case	.001"	0-15-0	.030"
711FSBZ	52927	Indicator with Gooseneck Shank in case	.001"	0-15-0	.030"
711FSZ	52929	Indicator without shank in case	.001"	0-15-0	.030"
711HSAZ	52951	Indicator with Universal Shank in case	.0005"	0-15-0	.030"
711HSBZ	52952	Indicator with Gooseneck Shank in case	.0005"	0-15-0	.030"
711HSZ	52953	Indicator without shank in case	.0005"	0-15-0	.030"
711MFSAZ	52926	Metric Indicator with Universal Shank in case	0.01 mm	0-35-0	0.7 mm
711MFSBZ	52928	Metric Indicator with Gooseneck Shank in case	0.01 mm	0-35-0	0.7 mm
711MFSZ	52930	Metric Indicator without shank in case	0.01 mm	0-35-0	0.7 mm
711F	52939	Universal Shank only, complete (Part No. 7103A)	—	—	—
711F	52937	Gooseneck Shank only, complete (Part No. 7107A)	—	—	—

NOTE: also available with plain dial. In ordering, omit "S" after catalog number.

NOTE: Universal Shank or Gooseneck Shank can be used on Nos. 454-18", 454-24" and all sizes No. 254 Vernier Height Gages.

NOTE: Rubber Dust Guard available. See page 330 for this and other attachments.

Sent with shaded dial, Universal Shank in attractive, protective case unless otherwise ordered.

Packed one in a box.

Last Word® Dial Test Indicators

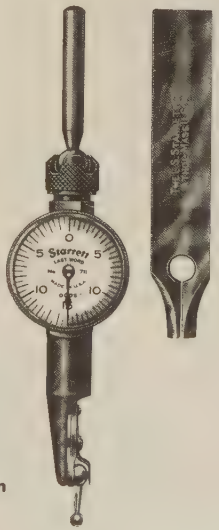
No. 711GS—Graduation .001"

No. 711LS—Graduation .0005"

No. 711MGS—Graduation 0.01 mm (Metric)

- ★ For precise indicating in machining, layout, inspection
- ★ Jeweled lever for extra smooth indicator action
- ★ Reversible action
- ★ Swiveling tubular body
- ★ Hard chrome plated ratchet contact point
- ★ With Universal Friction Holder, Universal Shank and case
- ★ With shaded dial for jig borer use

Completely flexible—with tighter swing, new features, new attachments—these indicators are used for precise measurements in machining, layout, checking and inspection work. The Universal Swivel Friction Holder on the end of the body adapts the indicator to jig borers, milling or boring machines. By means of the ball swivel joint, the indicator adjusts to sweep any hole or surface within its range. The Universal Shank attaches to the end of the friction holder, adapting the indicator to No. 454-18", No. 454-24" and all No. 254 Vernier Height Gages, as well as to lathe tool posts and milling machine arbors. Additional features include a jeweled lever for extra smooth indicator action; a switch lever on the body to reverse the action; a hard chrome plated .120" diameter ball contact point with ratchet joint for instant movement to any position; an adjustable 15/16" diameter dial; and a removable inspection hole cover screw for minor adjustments.



No. 711LS with Universal Friction Holder and Universal Shank

No. 711GS

SHADED DIALS

Nos. 711GS and 711LS Indicators furnished with shaded dials as shown. Shaded area is colored yellow.

No. 711LS

Cat. No.	EDP No.	Description	Graduation	Dial Reading	Range
711GCSZ	52943	Indicator complete with all attachments listed below, in case	.001"	0-15-0	.030"
711MGCSZ	52945	Metric indicator complete with all attachments below, in case	0.01 mm	0-35-0	0.7 mm
711LCSZ	52957	Indicator complete with all attachments listed below, in case	.0005"	0-15-0	.030"
711GPSZ	52944	Indicator with Universal Friction Holder and Shank in case	.001"	0-15-0	.030"
711MGPSZ	52946	Metric Indicator with Universal Friction Holder and Shank in case	0.01 mm	0-35-0	0.7 mm
711LPSZ	52958	Indicator with Universal Friction Holder and Shank in case	.0005"	0-15-0	.030"

ATTACHMENTS included with Nos. 711GCS, MGCS and LCS and shown on page 330 are: long and short arm, double jointed attachment, coupling, body clamp complete, surface gage attachment, vernier height gage attachment and regular contact points.

NOTE: also available with plain dial. In ordering, omit "S" after catalog number.

Sent complete with all attachments, and shaded dial in attractive, protective case unless otherwise ordered.

Packed one in a box.

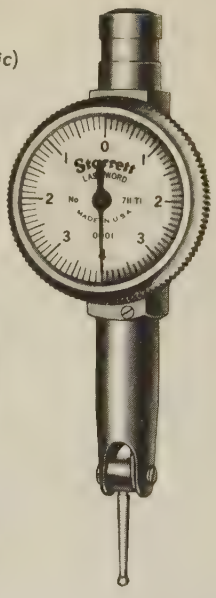
Last Word® Dial Test Indicators

No. 711-T1S—Graduation .0001"

No. 711M-T1—Graduation 0.002 mm (Metric)

With Swivel Clamp, Holding Bar, Offset and Height Gage Attachments

This high precision indicator has a jeweled movement and a jeweled contact lever for smooth mechanical action. The tubular body has a black finish, and the 1" diameter dial has a satin chrome bezel. The frictionally adjustable contact point, hard chrome plated (carbide on request), is 37/64" long x .078" ball diameter. On top of the body is a 3/8" diameter x 15/32" end-plug extension grooved for attaching Swivel Clamp No. 711-T1-51. This clamp can also be attached to the body ahead of the dial. A switch lever on the side of the body reverses the action or direction of the contact point. Sent complete with No. 711-T1-51 Swivel Clamp, No. 711-T1-52 Holding Bar, No. 711-T1-53 Offset Attachment and No. 711-T1-54 12" Height Gage Attachment—all in an attractive, protective case.



No. 711-T1S has a shaded dial for jig borer work and other applications. The shaded area is colored yellow.

Cat. No.	EDP No.	Description	Graduation	Dial Reading	Range
711T1SZ	52973	Indicator with shaded dial complete with four attachments in case	.0001"	0-4-0	.008"
711MT1Z	52975	Metric Indicator with regular dial complete with four attachments in case	0.002 mm	0-10-0	0.2 mm

NOTE: No. 711-T1S also available with regular (non-shaded) dial. In ordering, omit "S" after catalog number. Sent with shaded dial, attachments and case unless otherwise ordered.

Packed one in a box.

No. 711-T1-51
Part No. 11772A
EDP No. 71362
Swivel Clamp

Grips the indicator by its end plug extension. The 1/4" snug hole attaches the indicator to the holding bar, offset attachment and height gage attachment . . . also to the 9" rod of No. 252 Height Transfer Gages.

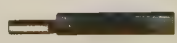
No. 711-T1-52
Part No. 11770A
EDP No. 71361
Holding Bar

1/4" diameter x 1-5/16" post and a 1/4" x 1/2" shank adapts the indicator and swivel clamp to No. 454-18" and 24" as well as all No. 254 Vernier Height Gages. Also to lathe tool post holders and milling machine arbors.

No. 711-T1-53
Part No. 11778
EDP No. 71363
Offset Attachment

For mounting the indicator in jig borer chuck or spindle of any other vertical or horizontal machine tool. 1/4" diameter x 3-15/16" overall length.

No. 711-T1-54
Part No. 11054
EDP No. 52942
12" Height Gage Attachment



Adapts the indicator and swivel clamp to No. 454-12" and all No. 255 Vernier Height Gages. 3/16" x 11/32" shank and 1/4" diameter where the swivel clamp is applied.

Last Word® Dial Test Indicators

No. 711D-10—Graduation .0001"

No. 711MD-10—Graduation 0.002 mm (Metric)

No. 711D-10, with graduations in ten-thousandths of an inch, is for gaging to extremely fine tolerances. This indicator has a jeweled lever for smooth mechanical action, an adjustable dial, and can be furnished with gooseneck or universal shank, or without shank, in an attractive, protective case.

Cat. No.	EDP No.	Description	Graduation	Dial Reading	Range
711D10BZ	52918	Indicator with Gooseneck Shank and case	.0001"	0-16	.024"
711MD10BZ	52919	Metric Indicator with Gooseneck Shank and case	0.002 mm	0-40	0.4 mm
711D10AZ	52920	Indicator with Universal Shank and case	.0001"	0-16	.024"
711MD10AZ	52921	Metric Indicator with Universal Shank and case	0.002 mm	0-40	0.4 mm
711D10Z	52922	Indicator without shank, with case	.0001"	0-16	.024"
711MD10Z	52923	Metric Indicator without shank, with case	0.002 mm	0-40	0.4 mm
711D-10	52937	Gooseneck Shank only, complete (Part No. 7107A)	—	—	—
711D-10	52939	Universal Shank only, complete (Part No. 7103A)	—	—	—

No. 711D-10 sent with Gooseneck Shank and case unless otherwise ordered.

Packed one in a box.

Repair Information on Last Word® Indicators

All working parts are hardened, and every indicator is inspected before shipment. We will not be responsible for damage done or adjustments disturbed after the indicator leaves our factory.

By using a short length of 1/4" round rod, any Last Word Indicator can readily be used with a surface gage or with attachments of the type furnished with No. 196 Universal Dial Test Indicator.

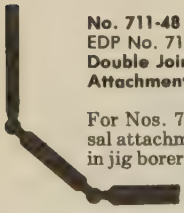
On all Last Word Indicators, the bezels are forced on and can be removed by inserting a knife blade between the bezel and the body of the indicator and prying it partly off. Revolve the dial a quarter turn and continue to pry until the bezel comes off. To replace the bezel, use a pair of jeweler's end cutting pliers with the cutting edges dulled with an oilstone so they will not injure the bezel. With one jaw resting on the bezel just above the knurled part and the other jaw against the underside of the dial plate, the bezel can be forced on a little at a time until the crystal is tight.

If No. 711D-10 Indicator shows backlash or does not come back to zero with a snappy movement, remove the side plate, and with a small pointed wood stick lift the lever out of the spiral groove, letting the spiral assume its own position; then let go of the lever and push the spiral toward the left until the lever snaps into the groove and replace the side plate. On Nos. 711F and 711G, which have a tubular body without side plate, remove the inspection hole cover screw.

Repair services are available at our factory in Athol, Mass. Prices will be quoted on receipt of instructions and worn or damaged indicator.

Attachments for No. 711 Series Last Word® Test Indicators

Attachments marked with an asterisk are furnished with Set Nos. 711GCS, 711LCS and 711MGCS.



No. 711-48
EDP No. 71441
Double Jointed Attachment*

For Nos. 711F, G, H, L. A universal attachment for holding indicator in jig borer.

No. 711—31-32-33
EDP No. 70929
Long and Short Arm*

For Nos. 711F, G, H, L. Use with Universal Shank or with No. 711-46 Coupling for additional flexibility and longer extension.

No. 711-46 (EDP No. 70556)
Coupling*

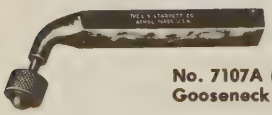
For Nos. 711G, L. Use with No. 711—31-32-33 Long and Short Arm to permit offset positioning of indicator.

No. 711—28-29-30
EDP No. 70924
Body Clamp Complete*

For Nos. 711F, G, H, L. Permits indicator to be held by its body.

No. 711EA
EDP No. 52924
Attachment*

For Nos. 711F, H. Inserts in place of end plug in indicator body, adapting these indicators to the chucks of jig borers, millers and other machine tools.



No. 7107A (EDP No. 52937)
Gooseneck Shank

For Nos. 711F, H and 711D-10. Replaces Universal Shank and Body Clamp, attaching directly to indicator body.

Rubber Dust Guard

For all No. 711 Series except No. 711D-10. Protects spindle by sealing out dust, powder and other foreign matter under adverse gaging conditions.

No. 711-47
EDP No. 70557
Surface Gage Attachment*

For Nos. 711G, L. Fits in place of ball shank of Universal Friction Holder for attaching indicator to 9", 12" and 18" surface gages.

No. 711-35
EDP No. 52942
Vernier Height Gage Attachment

For Nos. 711F, H, D-10 and T1. Attaches these indicators to No. 454-12" and all No. 255 Vernier Height Gages.

No. 711-49
EDP No. 52941
Height Gage Attachment

For Nos. 711F, H and 711D-10. Attaches these indicators to Nos. 454-10", 250-6" and 354-6" Height Gages and to No. 955 Universal Precision Gage.

No. 711-45
EDP No. 71113
Vernier Height Gage Attachment*

For Nos. 711G, L. Attaches these indicators to No. 454-12" and all No. 255 Vernier Height Gages. Screws on in place of Universal Friction Holder.

Contact Points

For Nos. 711F, G, H, L. No. 711-16 Regular Contact Point furnished with these indicators. All three sizes also available with tungsten carbide ball contacts.

Cat. No.	EDP No.	Ball Dia.
Regular Steel		
711-16A	70945	.035"
711-16B	70944	.062"
711-16	70912	.120"
Tungsten Carbide		
711-16AX	52964	.035"
711-16BX	52965	.062"
711-16X	52966	.120"

Universal Dial Test Indicators

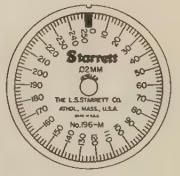
No. 196 Series—*Graduation .001", Range .200"*

No. 196M—*Graduation 0.01 mm, Range 5 mm*

No. 196M2—*Graduation 0.02 mm, Range 2.5 mm in One Turn*

No. 196B1 Indicator only, with No. 196E Contact Point.

Graduation—.001"
Dial reading—0-100
Range—0-.200"



No. 196M2B Indicator only, with No. 196E Contact Point.

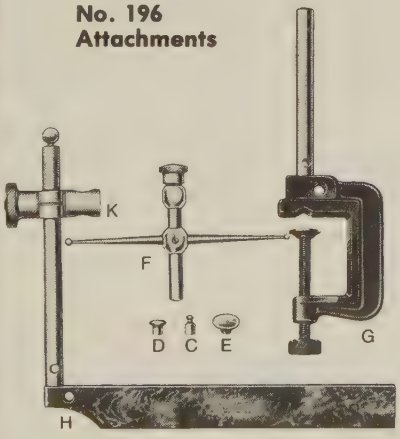
Graduation—0.02 mm
Dial Reading—0-250 (2.5 mm)
Range—2.5 mm in one revolution of hand

Sensitive, reliable and easy-to-read, No. 196 Universal Dial Test Indicator adjusts to any angle. The slightest pressure on the contact point produces a movement of the hand on the dial. The indicator comes with three hardened contact points. With points D and E, any outside surface may be checked including cutters, gears and racks. Point C, with its smaller radius and diameter, is used on plain, uninterrupted surfaces. Bring the contact point against the work with just enough pressure to give the hand one full turn. Set the hand to zero by turning the indicator rim. This provides one full rotation of the hand both to the right and left of zero, showing a rise or drop in the work and the amount of variation.

Tool post holder H with sleeve K is used in lathe work. Sleeve K is used on 5/16" diameter surface gage spindles and sleeve L on 3/8" spindles. Clamp G attaches the indicator to lathe and planer tools and milling arbors. Attachment F lets the indicator be used over obstructions and inside holes to a depth of about 1-5/8". By using a short length of round rod in sleeves K or L, any No. 711 Last Word Indicator may be used with No. 196 attachments.

NOTE: Nos. 196M and 196M2 indicators have yellow dials to identify metric graduation.

No. 196 Attachments



Dimensions

Tool Post Holder H—3/8" x 3/4" x 6" with Upright Spindle 5/16" diameter x 4-1/2"

Dial Indicator Stem—1/4" diameter x 1-1/2"

Clamp G—5/16" diameter post, 1-5/16" capacity flat or round

Universal Dial Test Indicators

No. 196 Series—*Graduation .001", Range .200"*

No. 196M—*Graduation 0.01 mm, Range 5 mm*

No. 196M2—*Graduation 0.02 mm, Range 2.5 mm in One Turn*

Continued

Cat. No.	EDP No.	Graduation	Dial Reading	Range	Description
196A1Z	50697	.001"	0-100	.200"	Indicator with continuous dial and complete with attachments (except No. 196L Sleeve) in case
196B1	50699	.001"	0-100	.200"	Indicator only, with continuous dial and 3 contact points (C, D, E) and No. 196R Adapter
196A6Z	50701	.001"	0-100	.200"	Anti-Magnetic indicator with continuous dial and complete with attachments (except No. 196L & 196R) in case
196B6	50702	.001"	0-100	.200"	Anti-Magnetic indicator only, with continuous dial and 3 contact points (C, D, E).
196A5Z	50714	.001"	0-50-0	.200"	Indicator with balanced dial and complete with attachments (except No. 196L Sleeve) in case
196B5	50717	.001"	0-50-0	.200"	Indicator only, with balanced dial and 3 contact points (C, D, E) and No. 196R Adapter
196A4Z	50713	.001"	0-40	.200"	Indicator with continuous dial and complete with attachments (except No. 196L Sleeve) in case
196B4	50716	.001"	0-40	.200"	Indicator only, with continuous dial and 3 contact points (C, D, E) and No. 196R Adapter
196A2Z	50712	.001"	0-20-0	.200"	Indicator with balanced dial and complete with attachments (except No. 196L Sleeve) in case
196B2	50715	.001"	0-20-0	.200"	Indicator only, with balanced dial and 3 contact points (C, D, E) and No. 196R Adapter
			Metric		
196MAZ	56305	0.01 mm	0-100	5 mm	Indicator with continuous dial and complete with attachments (except No. 196L Sleeve) in case
196MB	56306	0.01 mm	0-100	5 mm	Indicator only, with continuous dial and 3 contact points (C, D, E) and No. 196R Adapter
196M2AZ	50698	0.02 mm	0-250	2.5 mm*	Indicator with continuous dial and complete with attachments (except No. 196L Sleeve) in case
196M2B	50700	0.02 mm	0-250	2.5 mm*	Indicator only, with continuous dial and 3 contact points (C, D, E) and No. 196R Adapter

*In one revolution of hand. Indicator dial has red zone to signal limit of hand travel.

NOTE: No. 196M2AZ or M2B Indicator can be furnished with balanced dial reading 125-0-125 when specified at no extra cost.

No. 196A1Z complete in attractive, protective case sent unless otherwise ordered.

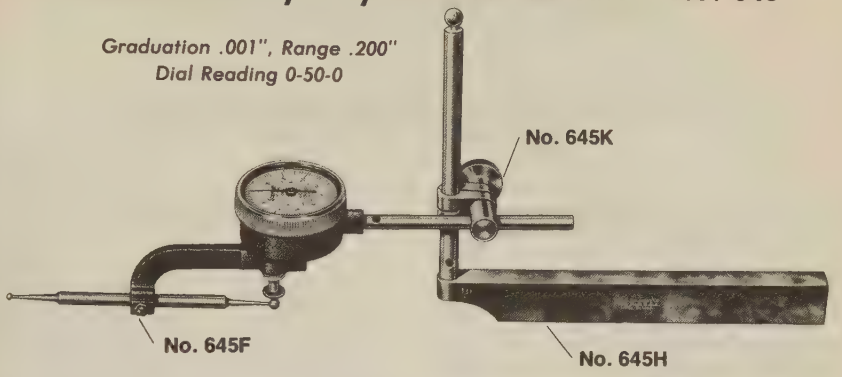
Packed one in a box.

Attachments

Cat. No.	EDP No.	Description
196C	70617	Contact Point
196D	70618	Contact Point
196E	70619	Contact Point
196F	50706	Hole Attachment
196G	50707	Clamp
196H	50312	Tool Post Holder With Upright Spindle
196K	50709	Sleeve Complete, 1/4" and 5/16" Holes
196L	50710	Sleeve Complete, 1/4" and 3/8" Holes
196R	50711	Adapter for contact points with 4-48 thread, as used on AGD dial indicators

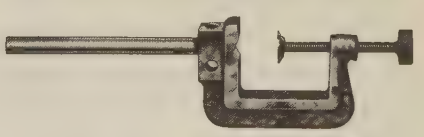
Universal Heavy Duty Dial Test Indicator No. 645

Graduation .001", Range .200"
Dial Reading 0-50-0



This test indicator has a rugged spiral type mechanism for severe applications around machinery and for general tool work. It is graduated in thousandths, reads 0-50-0, and has a range of .200", two complete revolutions of the hand. The dial is adjustable so that the 0 mark may be moved to any position in relation to the hand.

Hole attachment F (our No. 670B) adapts the indicator to internal work and permits checking to depths up to 1-11/16". No. 670A Attachment, for depths to 13/16" can also be used with the indicator. With clamp G, tool post holder H, and sleeve K or L, all types of mountings are possible. Sleeves K and L also attach the indicator to any surface gage.



No. 645G Clamp

6C 1C 5C

#4-48 AGD
Standard
Screw Thread

Tool Post Holder—3/8" x 3/4" x 6"
Upright Spindle—5/16" diam. x 4-1/2"
Dial Indicator Stem—1/4" diam. x 3-3/16"
Clamp G—1-5/16" capacity flat or round

Cat. No.	EDP No.	Description
645A5Z	52722	Indicator complete with attachments (except No. 645L Sleeve) in case
645B5	52723	Indicator only, with 3 contact points (1C, 5C, 6C)
645F	52724	Hole Attachment
645G	50707	Clamp
645H	50312	Tool Post Holder With Upright Spindle
645K	50709	Sleeve Complete, 1/4" and 9/16" Holes
645L	50710	Sleeve Complete, 1/4" and 3/8" Holes
—	70965	1C Contact Point Only (Part No. 7215)
—	71004	5C Contact Point Only (Part No. 7409)
—	70794	6C Contact Point Only (Part No. 6632-6)

NOTE: No. 645 Indicator can be furnished with dial reading 0-100 when specified at no extra cost.

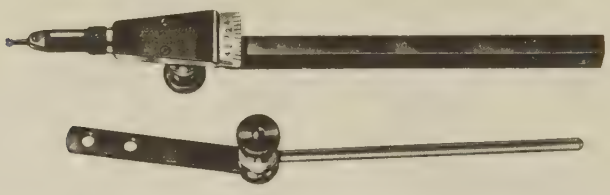
NOTE: contact points with special shapes or tipped with carbide, sapphire or diamond also available to order.

No. 645A5Z complete, with No. 645K Sleeve, in attractive, protective case sent unless otherwise ordered

Packed one in a box.

"Universal Junior" Indicator No. 564

Graduation .001 Inch—Range .010 Inch



An unusually sensitive .001" indicator with a universally adjustable sleeve that rotates 360 degrees and a contact point that can be used in any position with graduations always in direct view. The satin chrome reading plate has a .010" range and is graduated .005" each side of 0. The standard holding bar, 1/4" x 1/2" x 5", mounts directly in lathe tool posts and most height gages. The round rod adapts the indicator to surface gages and chucks, while the small flat bar is used with vernier height gages or as an extension. All working parts are hardened. The indicator body is a chrome plated die casting. Its case is about 1/4" thick, its width tapering from 11/16" to the ball contact point which has a 7/64" diameter. The overall case length is 2-3/4" including the contact point. Also available are 1/16" and 1/32" ball contacts.

Cat. No.	EDP No.	Description
564	52573	Indicator complete with 7/64" contact point and all attachments
—	71045	7/64" Contact Point Only (Part No. 7752A)
—	71095	1/32" Contact Point Only (Part No. 8397)
—	71094	1/16" Contact Point Only (Part No. 8397)

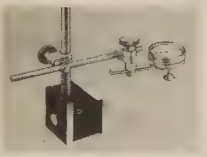
Attractive, protective case also available; sent without case unless otherwise ordered.

Packed one in a box.

Magnetic Base Indicator Holder No. 657AA

For Use with All AGD Dial Indicators, Miniature Dial Indicators and Starrett Dial Test Indicators

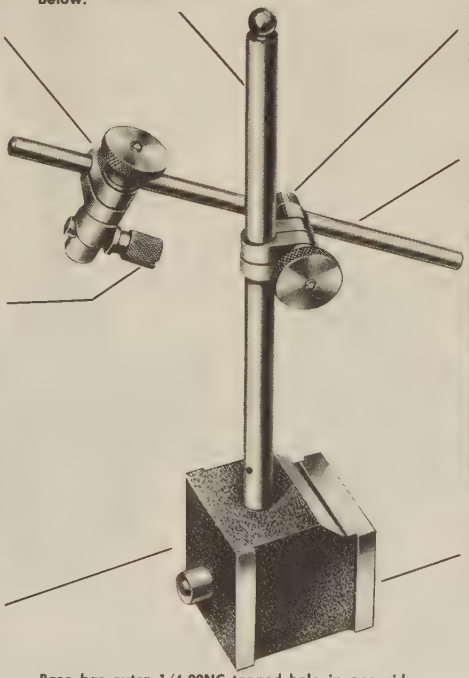
NO. 657S SLEEVE. Two 1/4" diameter holes. Adapts No. 196 Series Universal Dial Test Indicators (below) and No. 657Y Indicator Attachment to No. 657X Rod.



NO. 657Y INDICATOR ATTACHMENT. 1/4" O.D. one end, 1/4-20NC male threads opposite end, 3/8" O.D. shoulder between. Threaded end fits lug backs of all AGD indicators (Starrett Series 81, 25, 655, 656) and miniature indicators (Starrett Series 80 below). Knurled cap holds indicators in desired position.

NO. 657P MAGNETIC BASE. 1-15/16" high x 1-5/8" wide x 1-7/8" deep. Push-button on-off switch for one hand operation. Black wrinkle finish on non-working surfaces.

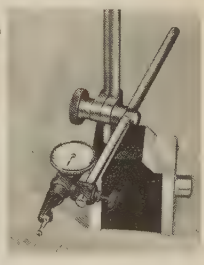
NO. 657G UPRIGHT BASE POST. 3/8" diameter x 7-7/16" length overall. 1/4-20NC threaded end screws into No. 657P Magnetic Base. Accommodates, in addition to No. 196L Sleeve, No. 57S and No. 58S Universal Surface Gage Sleeves—see note below.



Base has extra 1/4-20NC tapped hole in one side (not shown) for mounting post.

NO. 196L SLEEVE. 3/8" diameter hole fits No. 657G Upright Base Post. 1/4" diameter hole accommodates No. 657X Rod.

NO. 657X ROD. 1/4" diameter x 6" long. Accommodates No. 711F Series Dial Test Indicators (as shown) and No. 657S Sleeve.



Base has three precision ground magnetic contact surfaces. Grips horizontally, vertically or upside down. V-step holds base to arbors, shafts, chucks.

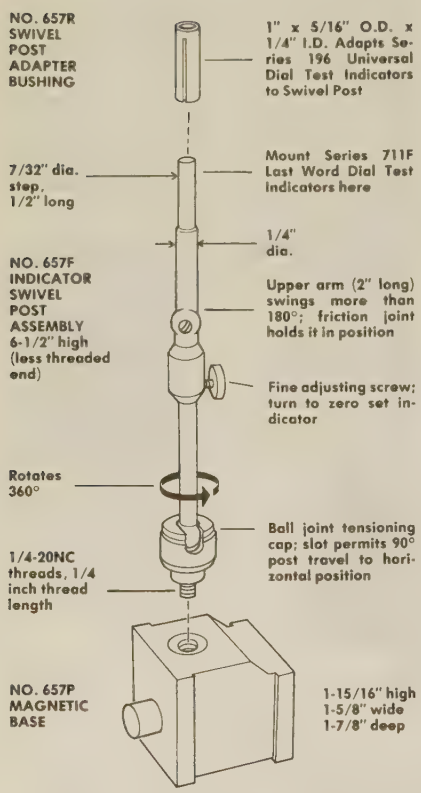
Cat. No.	EDP No.	Description
657AA	52743	Magnetic Base with No. 657G Upright Base Post, No. 196L Sleeve, No. 657S Sleeve, No. 657X Rod and No. 657Y Indicator Attachment
657G	52753	Upright Base Post only, less base
196L	50710	Sleeve
657P	52757	Magnetic Base only, without post or attachments
657S	52759	Sleeve
657X	52764	Rod
657Y	52765	Indicator Attachment

NOTE: Nos. 57S or 58S Universal Sleeves may be used in place of 196L Sleeve. See page 232 for specifications.

Packed one in a box.

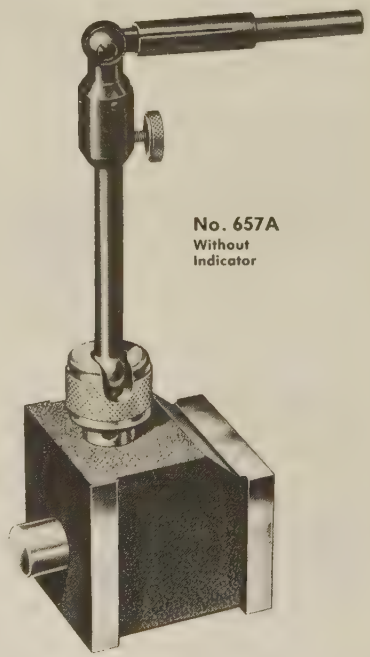
Magnetic Base Indicator Holders

Parts, Dimensions, Features Series 657A, B, C


NO. 657R SWIVEL POST ADAPTER BUSHING
1" x 5/16" O.D. x 1/4" I.D. Adapts Series 196 Universal Dial Test Indicators to Swivel Post
7/32" dia. step, 1/2" long
Mount Series 711F Last Word Dial Test Indicators here
1/4" dia.
NO. 657F INDICATOR SWIVEL POST ASSEMBLY 6-1/2" high (less threaded end)
Upper arm (2" long) swings more than 180°; friction joint holds it in position
Fine adjusting screw; turn to zero set indicator
Rotates 360°
Ball joint tensioning cap; slot permits 90° post travel to horizontal position
1/4-20NC threads, 1/4 inch thread length
NO. 657P MAGNETIC BASE
1-15/16" high
1-5/8" wide
1-7/8" deep

Powerful permanent magnet base holds firmly to steel or iron surfaces—horizontally, vertically, upside-down. Pushbutton turns magnetic force on or off for quick, one-hand set-up and take-down. V-step adapts base to horizontal or vertical arbors and chucks. Extra 1/4-20 tapped hole in side of base for indicator post. Three precision ground magnetic contact surfaces (plus V-step). Black wrinkle finish on non-working surfaces.

Magnetic Base with Indicator Swivel Post Assembly Complete



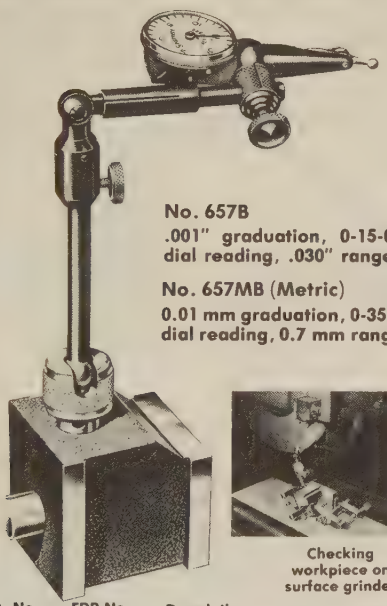
For use with No. 711 Series Last Word Dial Test Indicators, No. 196 Series Universal Dial Test Indicators and similar indicators of other manufacture. Parts, dimensions and features as shown in the drawing, left.

Cat. No.	EDP No.	Description
657A	52744	Magnetic Base with No. 657F Indicator Swivel Post Assembly Complete with No. 657R
657F	52752	Indicator Swivel Post Assembly Complete with No. 657R, less base
657P	52757	Magnetic Base only, without Post
657R	52758	Swivel Post Adapter Bushing only (for No. 657F)

Packed one in a box.

Magnetic Base Indicator Holders with Indicator Swivel Post Assembly and Dial Test Indicator

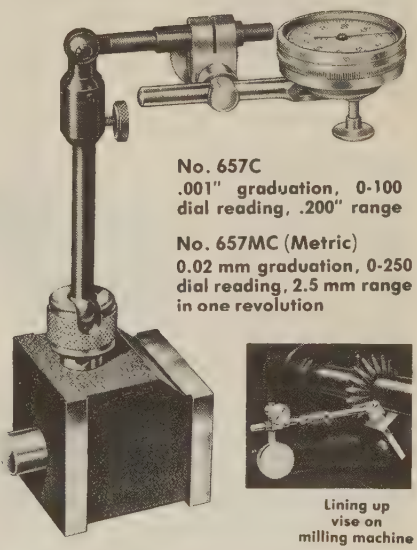
These gages provide universal adjustment in both horizontal and vertical planes. Available with English or metric dial test indicators, they shorten time on shop set-up, checking and inspection jobs. Parts, dimensions and features as shown on opposite page.



No. 657B
.001" graduation, 0-15-0 dial reading, .030" range

No. 657MB (Metric)
0.01 mm graduation, 0-35-0 dial reading, 0.7 mm range

Checking workpiece on surface grinder



No. 657C
.001" graduation, 0-100 dial reading, .200" range

No. 657MC (Metric)
0.02 mm graduation, 0-250 dial reading, 2.5 mm range in one revolution

Lining up vise on milling machine

Cat. No.	EDP No.	Description
657B	52745	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 711FS Last Word Dial Test Indicator without case
657BZ	52746	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 711FS Last Word Dial Test Indicator in attractive, protective case
657MB	56353	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 711MFS Metric Last Word Dial Test Indicator without case
657MBZ	56354	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 711MFS Metric Last Word Dial Test Indicator in attractive, protective case
657C	52747	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 196B Universal Dial Test Indicator with No. 196K Sleeve without case
657CZ	52748	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 196B Universal Dial Test Indicator with No. 196K Sleeve in attractive, protective case
657MC	56355	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 196M2B Metric Universal Dial Test Indicator with No. 196K Sleeve without case
657MCZ	56356	Magnetic Base with No. 657F Indicator Swivel Post Assembly complete with No. 657R and No. 196M2B Metric Universal Dial Test Indicator with No. 196K Sleeve in attractive, protective case
657F	52752	Indicator Swivel Post Assembly complete with No. 657R, less base and indicator
657P	52757	Magnetic Base only, without post or indicator
657R	52758	Swivel Post Adapter Bushing only (for No. 657F)
196K	50709	Sleeve (1/4" hole takes stem of Nos. 196B or 196MB; 5/16" hole fits 5/16" O.D. of No. 657R)

Available with or without case; sent in case unless otherwise ordered.

Packed one in a box.

Magnetic Base Indicator Holder with Upright Base Post Swivel Post Snug and Gage Holding Rod

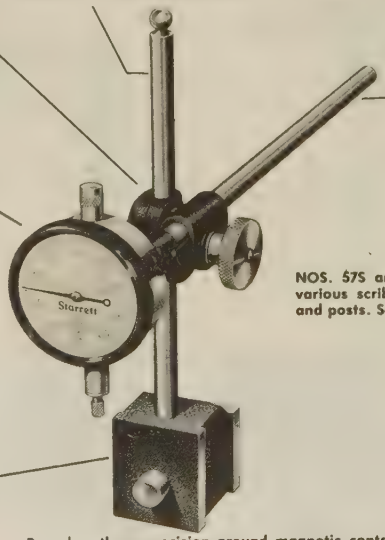
No. 657D—*Without Indicator* **No. 657E**—*Graduation .0005", Range .125"*
No. 657ME—*Graduation 0.01 mm, Range 2.5 mm (Metric)*

NO. 657H SWIVEL POST SNUG. Allows universal indicator adjustment—up-and-down, to any vertical angle, in a complete circle, and any distance from the base along the gage holding rod. One 3/8" diameter hole and one .465" diameter hole reduced to 3/8" I.D. by NO. 657K REDUCING BUSHING.

DIAL INDICATOR. AGD Group 2—2-1/4" diameter—with jewel bearings. No. 25-131 indicator furnished with No. 657E (graduation .0005", dial reading 0-25-0, range .125". No. 25-181 metric indicator furnished with No. 657ME (graduation 0.01 mm, dial reading 0-50-0, range 2.5 mm). NOTE: indicator should be supported in one hand or removed when the base is detached from the surface.

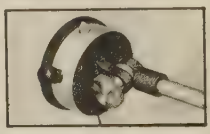
NO. 657P MAGNETIC BASE. 1-15/16" high x 1-5/8" wide x 1-7/8" deep. Pushbutton on-off switch for one hand operation. Black wrinkle finish on non-working surfaces.

NO. 657G UPRIGHT BASE POST. 3/8" diameter x 7-7/16" length overall. 1/4-20NC threaded end screws into No. 657P Magnetic Base. Accommodates No. 657H Swivel Post Snug. Also No. 57S or No. 58S Universal Surface Gage Sleeves.



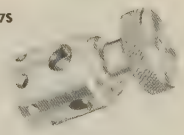
Base has three precision ground magnetic contact surfaces. Grips horizontally, vertically or upside down. V-step holds base to arbors, shafts, chucks, other round surfaces. Extra 1/4-20NC tapped hole in one side of base (not shown) for mounting post.

NO. 657J GAGE HOLDING ROD (Also ordered as No. 665C). 3/8" diameter x 9-1/2" long. Has clamping mechanism for gripping lug back of AGD dial indicators (below) and miniature dial indicators. Indicator may be set at any angle by loosening binding screw. Also accommodates No. 57S or No. 58S Universal Surface Gage Sleeves.

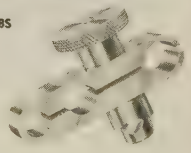


NOS. 57S and 58S UNIVERSAL SLEEVES adapt various scribers and indicator shanks to rods and posts. See page 232 for specifications.

57S



58S



Cat. No.	EDP No.	Description
657D	52749	Magnetic Base with No. 657G Post, No. 657H Snug, No. 657J Rod and No. 657K Bushing
657E	52750	Magnetic Base with No. 657G Post, No. 657H Snug, No. 657J Rod, No. 657K Bushing and No. 25-131J Dial Indicator (jewel bearings) without case
657EZ	52751	Magnetic Base with No. 657G Post, No. 657H Snug, No. 657J Rod, No. 657K Bushing and No. 25-131J Dial Indicator (jewel bearings) in attractive, protective case
657ME	56357	Magnetic Base with No. 657G Post, No. 657H Snug, No. 657J Rod, No. 657K Bushing and No. 25-181J Metric Dial Indicator (jewel bearings) without case
657MEZ	56358	Magnetic Base with No. 657G Post, No. 657H Snug, No. 657J Rod, No. 657K Bushing and No. 25-181J Metric Dial Indicator (jewel bearings) in attractive, protective case
657G	52753	Upright Base Post only, less base
657H	52754	Swivel Post Snug only
57S	50296	Universal Sleeve
58S	56613	Universal Sleeve
657J	52755	Gage Holding Rod including clamping mechanism
657K	52756	Reducing Bushing only (for No. 657H)
657P	52757	Magnetic Base only, without post or attachments

Sent in case unless otherwise ordered. Other indicators furnished on request.

Packed one in a box.

Flex-O-Post Indicator Holder with Magnetic Base No. 657T Series

For Use with All Dial Indicators

GAGE ROD. 3/8" diameter x 3" long. Has 5/16", 1/4" and 7/32" steps. Holds No. 196 Dial Test Indicators (by No. 657S Sleeve), and No. 711 Dial Test Indicators (by body clamp) as shown.

Snug grips AGD dial indicator directly by its 3/8" diameter stem

No. 657S Sleeve attaches No. 196 Test Indicator to 1/4" diameter of gage rod

ADJUSTING TAKE-UP SLEEVE with locking nut for maintaining proper degree of post rigidity.

SNUG. Has 3/8" diameter hole for gripping AGD dial indicators by the stem, and a 5/32" hole for scribers.

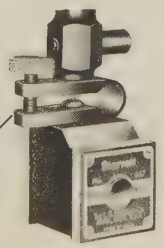
NO. 657U FLEX-O-POST

LOCKING LEVER. Tightens internal steel cable to make post rigid and lock it in position.

NO. 657P MAGNETIC BASE. 1-15/16" high x 1-5/8" wide x 1-7/8" deep. Pushbutton on-off switch. Black wrinkle finish on non-working surfaces.

Base has three precision ground magnetic contact surfaces. Grips horizontally, vertically or upside down. V-step holds base to arbors, shafts, chucks.

NO. 657W FINE ADJUSTMENT ATTACHMENT. Turn fine adjusting thumb screw (with post locked in rigid position) to zero set the indicator hand.



The Flex-O-Post is an assembly of short tubular steel sections and precision ball joints linked by an internal steel cable. It can be adjusted to any position and locked by turning a lever near the magnetic base. When locked, the post becomes rigid, holding its position until the locking lever is released. This makes it possible to use an AGD dial indicator or a dial test indicator in awkward places hard to reach with conventional holding devices.

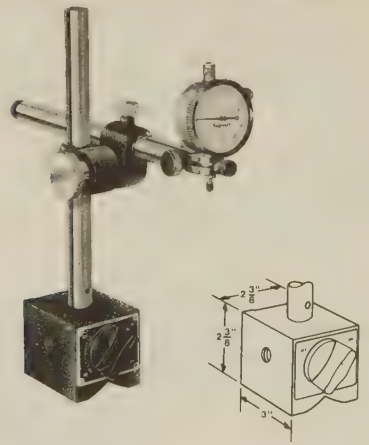
Assembled to the magnetic base, the Flex-O-Post has a vertical reach of 14-15/16" and a horizontal reach of 9-3/4". The indicator snug can be rotated through 360° and locked in any position by a knurled thumb screw. No. 657W Attachment can be furnished for fine adjustment of the indicator.

Cat. No.	EDP No.	Description
657T	52760	Magnetic Base with No. 657U Flex-O-Post, without No. 657W Fine Adjustment Attachment
657TW	52761	Magnetic Base with No. 657U Flex-O-Post, with No. 657W Fine Adjustment Attachment
657P	52757	Magnetic Base only, without post or attachments
657U	52762	Flex-O-Post only
657W	52763	Fine Adjustment Attachment

Packed one in a box.

Heavy Duty Magnetic Base Indicator Holder No. 659 with Rotary On-Off Switch

For Use with All AGD Dial Indicators



This gage has a powerful permanent magnet base that attaches to flat or round surfaces. A swivel post snug positions the dial indicator at any height and at any vertical or horizontal angle—and provides for axial travel and rotation of the gage rod. A stem clamp with 3/8" hole holds the indicator, allowing it to be faced in any direction. A knurled thumb screw locks each gage adjustment, with the final indicator setting accomplished by a fine adjustment at the opposite end of the gage rod.

A second tapped hole in one side of the base is for mounting the upright post horizontally or adding another post for multiple inspection work. The base is furnished with a threaded adapter, making it possible to use No. 657 Series Magnetic Base posts and attachments. Both the swivel post snug and base have black wrinkle finish with precision ground base contact surfaces. Furnished with or without No. 25-131 AGD Dial Indicator (.0005" graduation, 0-25-0 dial reading, .125" range) with jewel bearings. Other AGD indicators available on request. *Dimensions:* base 2-3/8" x 2-3/8" x 3"; upright post 9-3/8" x 3/4" diameter; gage rod 9-3/8" x 3/4" diameter.

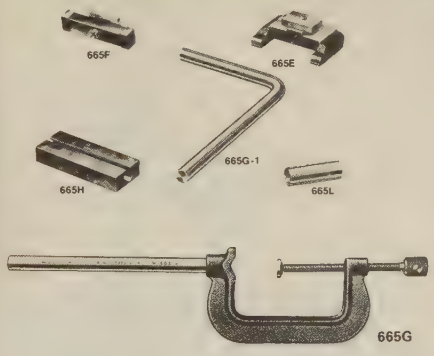
In addition to the above features, No. 659 has a rotary on-off switch and a form ground involute vee for accurate seating on round work up to 5" diameter.

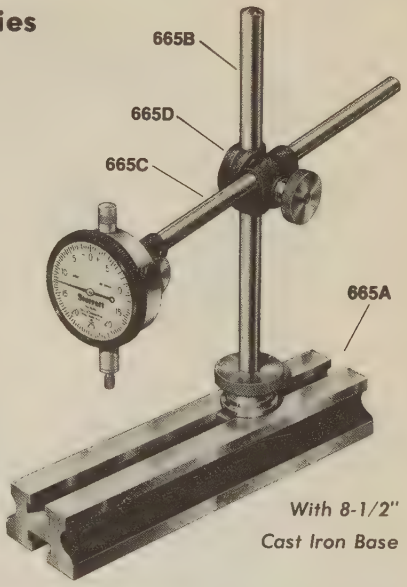
Cat. No.	EDP No.	Description
659A	56687	Base with upright post, swivel snug, gage rod, indicator clamp, fine adjustment and threaded adapter, without indicator without case
659AZ	55947	Magnetic Base with upright post, swivel snug, gage rod, indicator clamp, fine adjustment and threaded adapter without indicator in case
659BZ	55948	Magnetic Base with upright post, swivel snug, gage rod, indicator clamp, fine adjustment and threaded adapter with No. 25-131J dial indicator (jewel bearings) in case
659G	56688	Upright Base Post only, less base
659H	71597	Swivel Post Snug only
659J	72032	Gage Holding Rod, including clamping mechanism and fine adjustment
659P	55949	Magnetic Base only, including threaded adapter
18318	52769	Threaded Adapter only (for using No. 657 posts and attachments)

Packed one in a box.

NOTE: No. 659B also available with metric dial indicator. No. 25-181 (graduation 0.01 mm, dial reading 0-50-0, range 2.5 mm) sent unless otherwise specified.

Dial Test Indicator, No. 665 Series





With 8-1/2" Cast Iron Base

By means of swivel post snug D, the horizontal gage holding rod C (.375" dia. x 9-1/2") is adjustable to any position or is easily removed. The offset arm G-1 (.375" dia.) provides further adjustment. Guide stop E and keyway guide F, clamp in the base T-slot to permit checking from a beveled surface, keyway, T-slot, square edge or work plate. The tool post holder H permits use of horizontal gage holding rod C and offset arm G-1 with the dial indicator in lathe tool posts and other machine set-ups. Swivel post snug D has hole diameters of .465" to fit upright base post B (.456" dia x 8") and .375" to fit horizontal gage holding rod C as well as surface gage spindles. Reducing bushing L (which reduces the .465" hole to .375") is included, and bushings to reduce either or both holes to 1/4" or 5/16" can be furnished. Clamp attachment G, used with horizontal gage holding rod C and swivel post snug D, is a popular combination for inspecting jigs and fixtures, lining up work on centers and on machine tables. The swivel brass shoe on the screw prevents injury to finished surfaces. Clamp capacity about 3"; post height 5-3/4" x .465" diameter. If specified, can also be supplied with either 1/4", 5/16" or 3/8" post in place of standard .465" dia. at no extra charge.

Cat. No.	EDP No.	Description
665JZ	56275	With No. 25-131J Dial Indicator (.0005" graduation, 0-25-0 dial reading, 0 to .125" range) and with all attachments (except E and F), jeweled bearings, and case
665MJZ	56276	With No. 25-181J Dial Indicator (0.01 mm graduation, 0-50-0 dial reading, 2.5 mm range) and with all attachments (except E and F), jeweled bearings, and case

Cat. No.	EDP No.	Description
665A	52783	Base
665B	52784	Upright Base Post, including clamping mechanism
665C	52755	Horizontal Gage Holding Rod, including clamping mechanism
665D	52754	Swivel Post Snug, complete, including No. 665L Reducing Bushing
665E	52787	Guide Stop
665F	52788	Keyway Guide
665G	52792	Clamp Attachment
665G-1	52789	Offset Arm
665H	52790	Tool Post Holder
665L	52756	Reducing Bushing for Swivel Post Snug (.465" O. D., .375" I. D.)

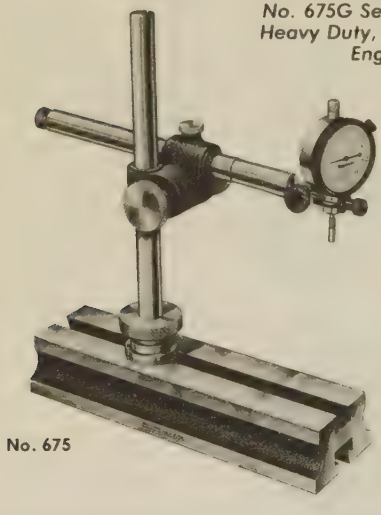
No. 665JZ sent unless otherwise ordered.

NOTE: other dial indicators also available.

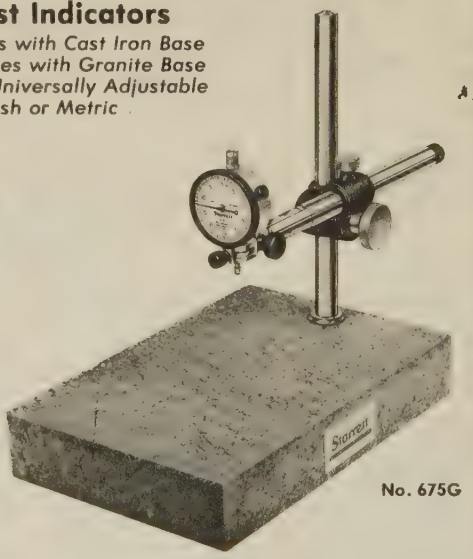
Packed one in a box.

Dial Test Indicators

No. 675 Series with Cast Iron Base
No. 675G Series with Granite Base
Heavy Duty, Universally Adjustable
English or Metric



No. 675



No. 675G

Extremely rugged and universally adjustable to any position, these gages are well suited to inspection, layout, checking and line-up operations anywhere in the shop. All settings are individually made without disturbing others. Quick height positioning of the indicator as well as angular adjustment in a horizontal plane is accomplished by a swivel post snug holding the 3/4" x 9-7/8" horizontal gage rod. A knurled thumb screw clamps the snug on the base post in any position. The swivel snug also provides angular adjustment in a vertical plane plus lengthwise gage rod adjustment, each movement having its own clamping knob. The indicator is zeroed in by a sensitive fine adjustment at the end of the gage rod. The indicator fine adjustment range is 1/4". A 3/4" indicator contact point is provided, but other lengths are available.

No. 675 Dial Test Indicator has a cast iron base, 10" long x 3" wide, with precision ground top and bottom faces. A T-slot extends the length of the bottom for attaching the gage to machines. The upright base post, 3/4" x 10-1/2", can be moved anywhere along its dovetail slot and locked in place by a knurled hand knob.

No. 675G Dial Test Indicator has a pink granite base, 8" x 12" x 2-1/4". Its 3/4" x 9-7/8" upright base post provides maximum rigidity for the entire indicator assembly.

Cat. No.	EDP No.	Base	Dial Indicator		Graduation	Dial Reading	Range
			Cat. No.	Bearings			
675JZ	52897	Cast Iron	25-131J	Jewel	.0005"	0-25-0	.125"
675MJZ	52898	Cast Iron	25-181J	Jewel	0.01 mm	0-50-0	2.5 mm
675GJ	55964	Granite	25-131J	Jewel	.0005"	0-25-0	.125"
675GMJ	56129	Granite	25-181J	Jewel	0.01 mm	0-50-0	2.5 mm

Cat. No.	EDP No.	Description
675A	56689	Cast Iron Base only
675B	56690	Upright Base Post, including clamping mechanism for cast iron base
675C	72032	Horizontal Gage Holding Rod, including clamping mechanism and fine adjustment
675D	71597	Swivel Post Snug only

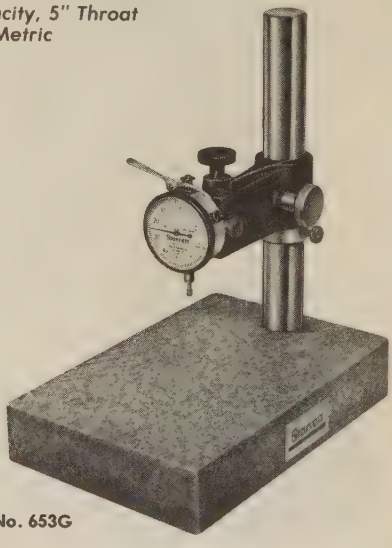
NOTE: any AGD dial indicator can be furnished if specified and will interchange with indicators listed above.

Cast Iron models furnished in case. Packed one in a box.

Dial Comparators

No. 653 Series with Cast Iron Base
No. 653G Series with Granite Base
9-1/4" Vertical Capacity, 5" Throat
English or Metric

No. 653



No. 653G

These bench type comparator gages are ruggedly built for in-process and final inspection work. The dial indicator is mounted on a beam that can be adjusted vertically on an upright post. A knurled thumb screw locks the beam in any position, and a sliding ring with locking screw (below the beam) permits swinging the indicator to either side. The ring also acts as a safety device, preventing accidental dropping of the beam. Final indicator setting is made by turning a fine adjusting knob on the beam. The indicator is operated by pressing down the hand lever to raise the spindle and releasing it to contact the work. If desired, the lever can be positioned for right hand operation.

No. 653 Dial Comparators have a ribbed, precision ground cast iron base measuring approximately 8" x 9". **No. 653G Dial Comparators** have a pink granite base, 8" x 12" x 2-1/4". Specifications common both to No. 653 and No. 653G gages are: 9-1/4" maximum vertical capacity; 5" maximum throat depth; 1-1/2" column diameter; 1/2" vertical adjustment of indicator.

Cat. No.	EDP No.	Base	Dial Indicator		Graduation	Dial Reading	Range
			Cat. No.	Bearings			
653J	52737	Cast Iron	655-141J	Jewel	.001"	0-50-0	.250"
653MJ	56146	Cast Iron	655-181J	Jewel	0.01 mm	0-50-0	2.5 mm
653GJ	55966	Granite	655-141J	Jewel	.001"	0-50-0	.250"
653GMJ	56127	Granite	655-181J	Jewel	0.01 mm	0-50-0	2.5 mm

NOTE: also available with special NONSHOCK mechanism or without indicator.

Packed one in a box.

Dial Bench Gages

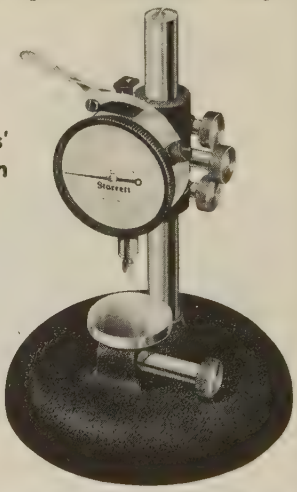
These compact gages are used for bench or beside-the-machine inspection of small parts and materials. The hand lever is pressed down to lift the spindle and released to contact the work under uniform pressure regulated by the indicator return spring. Left hand operation permits easy handling of work with the right hand (lever can be furnished to order at right). The dial can be rotated for zero setting and located in place with the bezel clamp.

Universal Dial Bench Gage No. 652 Series

With Sliding Table and Fine Adjustment

This gage has a ground and lapped table adjustable vertically on the post to suit various work thicknesses. It is locked in approximate position by the table bracket screw. A sliding ring on the post is also locked in position below the bracket and permits swinging the table to either side. Final setting of the table is made by a fine adjusting screw, using a locking screw to maintain the desired position.

Max. vertical capacity—1-3/4"
Max. throat depth—1-5/8"
Table diameter—2"
Table fine adjustment—1/8"
Column diameter—13/16"
Base diameter—5"



Inspectors' Dial Bench Gage No. 654 Series

With Sliding Head and Table

The ground and lapped table of this gage is vertically adjustable by hand and has a lock screw for final setting. The sliding indicator head travels up and down the column and swings left or right. It may be locked at any height and position with respect to the table. The indicator has a fine adjusting screw for bringing its contact point against the work and a lock screw to secure its final setting.

Max. vertical capacity—3"
Max. throat depth—1-1/2"
Table diameter—1-1/2"
Column diameter—.615"
Base diameter—5-1/2"

Cat. No.	EDP No.	Dial Indicator		Graduation	Dial Reading	Range
		Cat. No.	Bearings			
652JZ	52733	25-131J	Jewel	.0005"	0-25-0	.125"
652MJZ	52734	25-181J	Jewel	0.01 mm	0-50-0	2.5 mm
654JZ	52739	25-131J	Jewel	.0005"	0-25-0	.125"
654MJZ	52740	25-181J	Jewel	0.01 mm	0-50-0	2.5 mm

NOTE: all gages above can be furnished with other dial indicators; with tolerance hands; with special nonshock mechanism; with special sizes and shapes of contact points and tables.

Furnished in case. Packed one in a box.

Dial Bore Gages
No. 82 Series

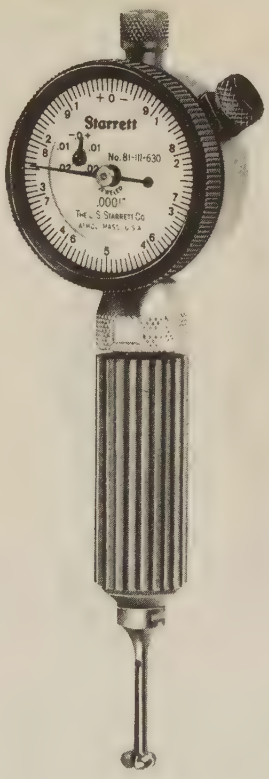
Range .107 to 1.565 Inches

★ **Self-centering with direct readings to .0001" for rapid in-process and final inspection**

★ **Especially useful for controlling approach to tight tolerance range without removing workpiece from machine**

This gage measures the diameter of any hole within range of its interchangeable probes. With the indicator set to the nominal dimension and its dial adjusted to zero, the probe is inserted in the hole with variations to .0001" read on the indicator. The split-ball contact presents a self-centering spherical surface to the work, making the gage useful for detecting hole geometry problems like taper, bellmouth and out-of-roundness. The gage has a fluted body for positive grip and a knurled chuck nut with wrench flats for securing the indicator stem in position. The probes are threaded and have wrench flats for assembly to the gage body. Their contacts are hard chrome plated for wear and polished to a mirror finish. Since measurements are taken by comparison, a set master such as gage blocks or bench type micrometer should be used as a reference standard. Master setting rings may also be used—prices on request.

Each dial bore gage set consists of probes and dial indicator specified in the table—plus one fluted body, one actuating rod and two adjusting wrenches. Dial indicators available with jewel bearings only. Probes are available separately—order by individual size range.



No. 82B Dial Bore Gage

Cat. No.	EDP No.	Total Range	Range Each Probe	Max. Bore Depth	Dial Indicator	
					Graduation	Cat. No.
82AZ	55791	.107" to .266"	.107" to .140"; .139" to .172"; .171" to .203"; .202" to .234"; .233" to .266"	13/16"	.0001"	81-111-630J
82BZ	55792	.217" to .594"	.217" to .281"; .279" to .344"; .342" to .405"	1-1/2"	.0001"	81-111-630J
			.403" to .469"; .467" to .532"; .530" to .594"	1-3/4"		
82CZ	55793	.560" to 1.565"	.560" to .690"; .685" to .815"; .810" to .940"	2-1/2"	.0001"	25-611-620J
			.935" to 1.065"; 1.060" to 1.190"; 1.185" to 1.315"; 1.310" to 1.440"; 1.435" to 1.565"	*5"		

*Includes insertion of gage body into bore.

NOTE: indicators also available with metric graduation.

Sets furnished in attractive, protective case; packed one in a box.

Dial Bore Gages
No. 84 Series

Eight Models—Range 1.500" to 12.125"

No. 84-111-4
No. 84-134-4

No. 84-111-5
No. 84-134-5

No. 84-111-6
No. 84-134-6

No. 84-111-7
No. 84-134-7

For inspecting bores and checking hole size during machining. An adjustable range screw with positive locking feature and two centralizing plungers provides three-point contact for true alignment. Can be operated over full range without readjusting setting of gage housing on extension tube. The gaging contact and centralizing plungers are hardened tool steel, spring loaded for sensitivity and repeatability, and travel in bronze bushings. The range screw, also hardened tool steel, is inserted in a steel sleeve. Housing and knurled handle are aluminum with black finish. Dial indicators furnished with jewel bearings. Place the gage on a surface plate and adjust to size with a master ring gage, gage blocks in parallel jaws, outside micrometer or vernier caliper. Also available to order with tungsten carbide contacts.

Checking hole size. Dial Bore Gage has been previously adjusted to size by master ring gage.

Inspecting bore size in tenths during a grinding operation.

Dial Bore Gages, No. 84 Series Continued

Jewel Bearings		Total Range with Extension	Range Each Extension	Dial Indicator Graduation
Cat. No.	EDP No.			
Max. Bore Depth 4"; Max. Plunger Travel .030"				
84Z-111-4J	56264	1-1/2" to 3"	1.500" to 1.800" 1.800" to 2.100" 2.100" to 2.400" 2.400" to 2.700" 2.700" to 3.000"	.0001"
84Z-134-4J	56270	1-1/2" to 3"	1.500" to 1.800" 1.800" to 2.100" 2.100" to 2.400" 2.400" to 2.700" 2.700" to 3.000"	.0005"
Max. Bore Depth 6"; Max. Plunger Travel .035"				
84Z-111-5J	50386	3" to 5-3/16"	3.000" to 3.750" 3.750" to 4.468" 4.468" to 5.187"	.0001"
84Z-134-5J	50392	3" to 5-3/16"	3.000" to 3.750" 3.750" to 4.468" 4.468" to 5.187"	.0005"
84Z-111-6J	50388	5" to 8-1/8"	5.000" to 6.187" 6.187" to 7.125" 7.125" to 8.125"	.0001"
84Z-134-6J	50394	5" to 8-1/8"	5.000" to 6.187" 6.187" to 7.125" 7.125" to 8.125"	.0005"
Max. Bore Depth 7"; Max. Plunger Travel .035"				
84Z-111-7J	50390	8" to 12-1/8"	8.000" to 10.000" 10.000" to 12.125"	.0001"
84Z-134-7J	50396	8" to 12-1/8"	8.000" to 10.000" 10.000" to 12.125"	.0005"

NOTE: bore depths also available to 12" by 1" increments.

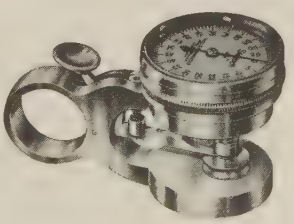
Sent with jewel bearings in case.

Packed one in a box.

Dial Sheet Gage

No. 170—Range 0-.150"
No. 170M—Range 0-4 mm (Metric)

Measures sheet materials like paperboard, leather, plastics and metals. With one finger through the ring, press down on the pad with the thumb to raise the movable contact. Insert the work, remove the thumb, and spring pressure holds the work parallel with the contacts, its thickness being registered on the dial. By turning the knurled bezel, the dial may be moved to bring the hand to zero. Throat depth 1-1/8".



Cat. No.	EDP No.	Graduation	Dial Reading	Range
170Z*	50647	.001"	0-100	0-.150"
170	50648	.001"	0-100	0-.150"

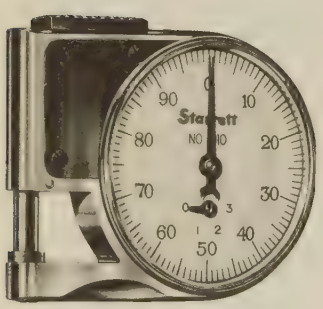
*In case.

No. 170Z sent unless otherwise ordered.

Packed one in a box.

Dial Indicator Pocket Gage

No. 1010 Series, No. 1010M Series (Metric)



About the size of a thin pocket watch, No. 1010 is used by inspectors, purchasing agents and salesmen to check the size of materials up to 3/8" thick. The gage fits naturally into the curve between the thumb and index finger, a slight pull on the serrated plate raising the spindle for inserting the work between the measuring contacts. Throat depth ranges from 1/2" down to 5/16"; diameter of the flat contacts is 1/4". The gage has a small count hand for recording each revolution of the large hand. The case is a die casting, chrome plated, with an unbreakable crystal. Also available at slight additional cost with rounded contacts.

Cat. No.	EDP No.	Graduation	Dial Reading	Range
1010Z	53114	.001"	0-100	3/8"
1010EZ	53115	.0005"	0-50	3/8"
1010MZ	53116	0.01 mm	0-100	9 mm
*1010RZ	56067	.001"	0-100	.275"

*Rounded contacts. Furnished in attractive, protective case. Packed one in a box.

Portable Dial Hand Gages

No. 1015 Series, No. 1015M Series (Metric)

These gages are gripped by the finger holes and operated by pressing down the thumb lever to raise the spindle for inserting work between the measuring contacts. Releasing the lever causes the spindle to contact the work, giving an accurate size reading because measuring pressure is independent of the user. Readings are taken directly from the dial indicator which has a direct reading count hand. The dial can be adjusted relative to zero and locked with the bezel clamp screw. Indicators have jewel bearings and continuous dials (models with balanced dials, other graduations and ranges to order). Throat depth for all models is 2-1/2"; diameter of contacts is 3/8" with 1/4" flat (special sizes and shapes on request).

No. 1015A

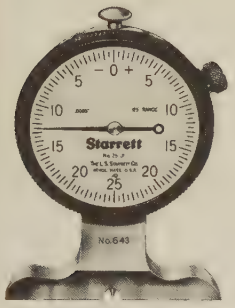
In Case		Without Case		Dial Indicator No.	Graduation	Dial Reading	Range
Cat. No.	EDP No.	Cat. No.	EDP No.				
1015AZ	53118	1015A	53119	1015A-431J	.0005"	0-50	1/2"
1015BZ	53120	1015B	53121	1015B-441J	.001"	0-100	1"
1015MAZ	56130	1015MA	56131	1015MA-481J	0.01 mm	0-100	10 mm
1015MBZ	56132	1015MB	56133	1015MB-881J	0.01 mm	0-100	25 mm

Sent with case unless otherwise ordered.

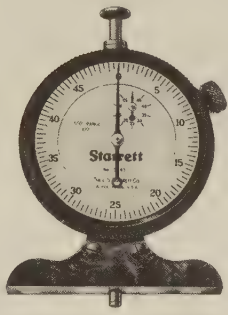
Packed one in a box.

Dial Depth Gages

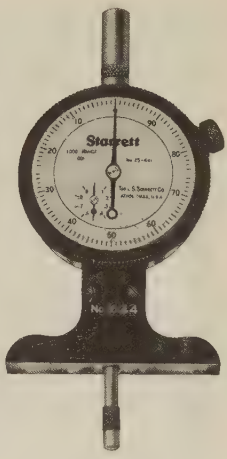
English or Metric



No. 643 Series
.0005" Graduation



No. 640 Series
.0005" Graduation
No. 640M Series
0.01 mm Graduation



No. 644 Series
.001" Graduation
No. 644M Series
0.01 mm Graduation

No. 643 Dial Depth Gage has a knife edge base with cut-out for precise positioning of its needle-point contact. Both base and point are hardened and ground. Press down the push button until the needle point contacts the work. Depths to .125" are read directly on the dial to .0005". A No. 25-131 Special Dial Indicator is attached to the base by set screws and interchanges with other AGD dial indicators. Base length 2-1/2".

No. 640 Dial Depth Gage. Press the push button down until the rod contacts the work and read the depth to .0005" on the dial. Total range 1/2". Includes a No. 25-431 Special Dial Indicator. The base is hardened and ground. Other AGD dial indicators on request. **No. 640R Dial Depth Gage** has a reverse movement (no push button) for use with one hand. The rod and contact point extend the full range, and when applied to the work, automatically adjust to the hole depth read directly from the dial. Base: 2-1/2" long, 17/32" wide.

No. 644 Dial Depth Gage has a hardened and ground flat base positioned on the surface of the work. The rod enters the hole or recess to its full depth, the measurement reading directly to .001" on the dial. A No. 25-441 Dial Indicator, 1.000" range, is attached to the base by set screws and interchanges with other AGD indicators. The gage is equipped with one rod covering a range of 0 to 1 inch and comes with two additional rods for ranges of 1 to 2 inches and 2 to 3 inches. Base: 2-1/2" long, 1/2" wide.

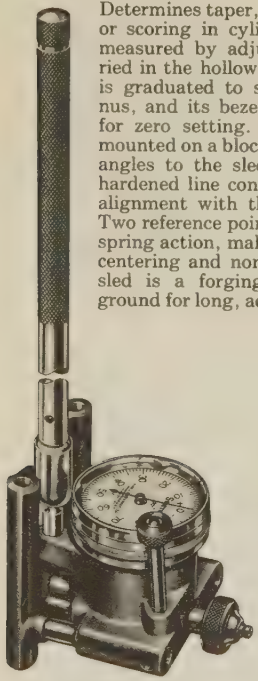
Jewel Bearings				Range	Graduation	Dial Reading
In Case		Without Case				
Cat. No.	EDP No.	Cat. No.	EDP No.			
643JZ	52714	643J	52715	0 to .125"	.0005"	0-25-0
640JZ	52705	640J	52706	0 to 1/2"	.0005"	0-50
640MJZ	55997	640MJ	55998	0 to 10 mm	0.01 mm	0-100
640RJZ	52709	640RJ	52710	0 to 1/2"	.0005"	0-50
640MRJZ	56001	640MRJ	56002	0 to 10 mm	0.01 mm	0-100
644JZ	52718	644J	52719	0 to 3"	.001"	0-100
644MJZ	56027	644MJ	56028	0 to 75 mm	0.01 mm	0-100

Sent with case unless otherwise ordered.

Packed one in a box.

Cylinder Gages

No. 452 Series—Range 2-1/10 to 9 Inches
No. 452M Series—Range 54 to 150 mm (Metric)



No. 452B
Range 2-1/2"-6"

Determines taper, out-of-roundness or scoring in cylinders. Bores are measured by adjustable rods carried in the hollow handle. The dial is graduated to show plus or minus, and its bezel may be rotated for zero setting. The indicator is mounted on a block moving at right angles to the sled which has two hardened line contacts in constant alignment with the cylinder wall. Two reference points have a double spring action, making the gage self centering and non-collapsible. The sled is a forging, hardened and ground for long, accurate life.

The handle locks in a perpendicular or angular position or may be transformed by a slight turn into a toggle joint with a wide sweep. Extra handles may be screwed one into another to make a long extension. The locking screw (stem protruding above dial) clamps the contact points in position for measurement with a micrometer.

Cat. No.	EDP No.	Range	Graduation	Dial Reading	One Rev.
452B	52339	2-1/2" to 6"	.001"	0-100	.100"
452B-9	52341	2-1/2" to 9"	.001"	0-100	.100"
452E	52342	2-1/10" to 6"	.001"	0-100	.100"
452E-9	52344	2-1/10" to 9"	.001"	0-100	.100"
452MB	52340	63 to 150 mm	0.01 mm	0-100	1.0 mm
452ME	52343	54 to 150 mm	0.01 mm	0-100	1.0 mm

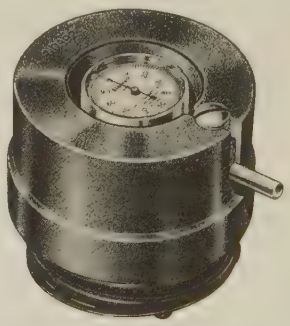
NOTE: height from contact points to top of handle is 10".

Packed one in a box.

Vibrometer No. 192 and No. 192M (Metric)

Compares Amplitude of Vibration Under Different Conditions of Speed and Load

This instrument detects and indicates the relative amplitude of vibration of diesel engines, air compressors, turbines and other machinery rotating at high speed. Amplitude readings taken at or near the bearings are a significant indication of a rotor's existing dynamic balance. The Vibrometer is particularly useful for comparing one set of readings to a subsequent set under different load conditions, giving a warning of increasing mechanical as well as possible electrical unbalance.



The dial indicator is set in a heavy metal retaining ring to the bottom of which is fastened a coiled spring and steel plate holding three soft rubber shoes. Such a contact provides friction so when testing on an incline or contour, the position of the Vibrometer is maintained. In use, the retaining ring, because of its inertia, tends to remain stationary in space, permitting the vibration of the shaft to be shown by the movement of the hand on the dial indicator.

The dial indicator, which is set to zero by rotating its bezel, may be removed from the Vibrometer for other shop uses. The Vibrometer case has black wrinkle finish; other parts are chrome or nickel plated to resist rust.

Cat. No.	EDP No.	Graduation
192Z	50694	.001"
192MZ	50695	0.02 mm

NOTE: furnished in attractive, protective case at no extra charge.

Packed one in a box.

Inside Dial Gages

No. 697—Range 2-3/8 to 18 Inches

No. 697M—Range 61 to 458 mm (Metric)

No. 697

This gage is used between two walls to check parallelism; also to take comparative measurements of internal diameters. There are ten rods and one extension. The rods are marked to designate the approximate overall length of the gage, and all measuring contacts are rounded. The indicator bezel is rotated to adjust the dial in relation to the hand and has a non-breakable crystal. The movement of the dial indicator is about 5/32". Rods of different lengths will be furnished on request.

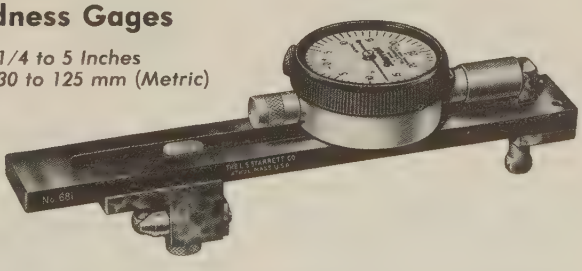
Cat. No.	EDP No.	Range	Graduation	Dial Reading	One Rev.
697Z	52907	2-3/8" to 18"	.001"	0-20-0	.040"
697MZ	52908	61 to 458 mm	0.01 mm	0-50-0	1.0 mm

NOTE: furnished in attractive, protective case at no extra charge.

Packed one in a box.

Out-of-Roundness Gages

No. 681—Range 1-1/4 to 5 Inches
No. 681M—Range 30 to 125 mm (Metric)



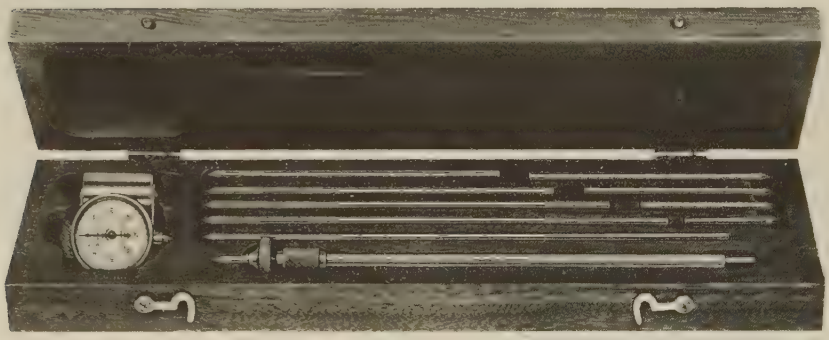
A compact, easy-to-apply gage for checking the out-of-roundness of connecting rod bearings and holes of shallow depth. Also for inspecting parallelism and alignment of slots and assembled parts in jig and fixture work. A dial indicator is mounted on top of the base, and on the bottom a positive locking adjustable slide which is readily set to the approximate hole size or slot width. The sliding head has two line contacts under spring tension, insuring constant alignment. Bearing surfaces and contact points are hardened. The contact points are inserted to a depth of approximately 3/8".

Cat. No.	EDP No.	Range	Dial Indicator No.	Graduation	Dial Reading	Range
681	52899	1-1/4" to 5"	81-145	.001"	0-25-0	.125"
681M	52900	30 to 125 mm	81-181	0.01 mm	0-50-0	2.5 mm

Packed one in a box.

Crankshaft Distortion Dial Gage or Strain Gage

For checking distortion of engine shafts and frames
No. 696—Graduation .001", Range 2-3/8 to 18"
No. 696M—Graduation 0.01 mm, Range 61-458 mm (Metric)



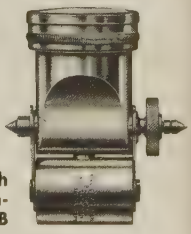
An ideal gage for checking bearing alignment or shaft deflection without dismantling the engine. Also useful as a strain gage on engine frames.

This inside measuring gage checks the distortion of crankshaft webs (Fig. 1 and Fig. 2 next page). This distortion bears a direct relation to existing misalignment or excessive bearing wear. The gage makes it possible to check bearing alignment or undue shaft deflection without dismantling the engine. Used on all Diesel engine shafts and the center-crank shafts on any type of engine or compressor, the gage can also be applied as a strain gage on engine frames (Fig. 3 and Fig. 4 next page) while the engine is operating. A comparison of readings taken at top and bottom positions indicates any misalignment of cylinder and frame which results in local over-stress and eventual cracking of the frame neck.

With a special spring tension in the dial indicator, the gage is self-sustaining in any position without sacrificing necessary rigidity, thus leaving the operator's hands free. The contact points are conical, about 60° included angle, hardened and ground to a sharp point, and will stay in place on 45° surfaces.

No. 696B Balancing Attachment is furnished with the gage. For certain applications—like turning the crank under test with the gage in place—the attachment can be adjusted to maintain the face of the indicator upward or

No. 696B Balancing Attachment only



No. 696 Gage Head with short contact point inserted and with No. 696B Balancing Attachment

in desired position. To install it on a strain gage in use, remove the knurled clamping nut, then the doweled plate or end strap at either end by the screw. The unit is then positioned over the hubs on two sides of the indicator head. A spring plunger provides the friction that holds the balance in proper relation to position. The parts are nickel plated.

The dial indicator movement is about 5/32" and with rods and extension, provides a range from 2-3/8" to 18". There are ten rods and one extension. The rods are marked to designate the approximate overall length of the gage. The indicator has a movable bezel to adjust the dial in relation to the hand and a non-breakable crystal.

Crankshaft Distortion Dial Gage or Strain Gage No. 696 Series—Cont.

Fig. 1

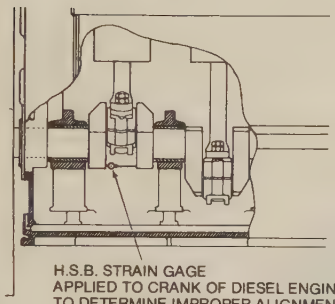
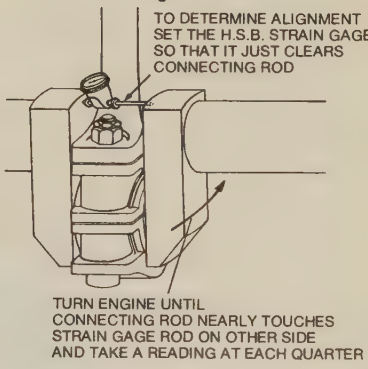
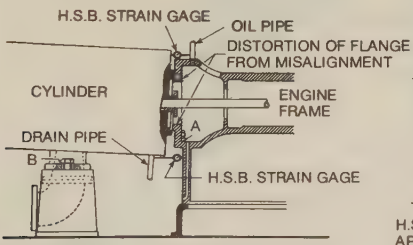


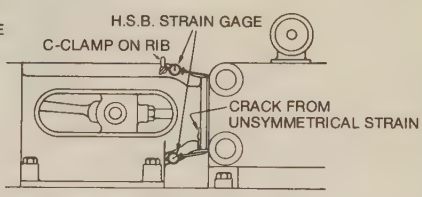
Fig. 2


TO DETERMINE ALIGNMENT
SET THE H.S.B. STRAIN GAGE
SO THAT IT JUST CLEARS
CONNECTING ROD
TURN ENGINE UNTIL
CONNECTING ROD NEARLY TOUCHES
STRAIN GAGE ROD ON OTHER SIDE
AND TAKE A READING AT EACH QUARTER



MISALIGNMENT OF CYLINDER AND ENGINE FRAME (SHOWN EXAGGERATED FOR PURPOSES OF ILLUSTRATION)

Fig. 3



H.S.B. STRAIN GAGE
APPLIED TO ENGINE FRAME (WHILE OPERATING)
DIFFERENCE BETWEEN TOP AND BOTTOM READINGS OF THE STRAIN GAGE INDICATES IMPROPER ALIGNMENT, CAUSING CRACKS

Fig. 4

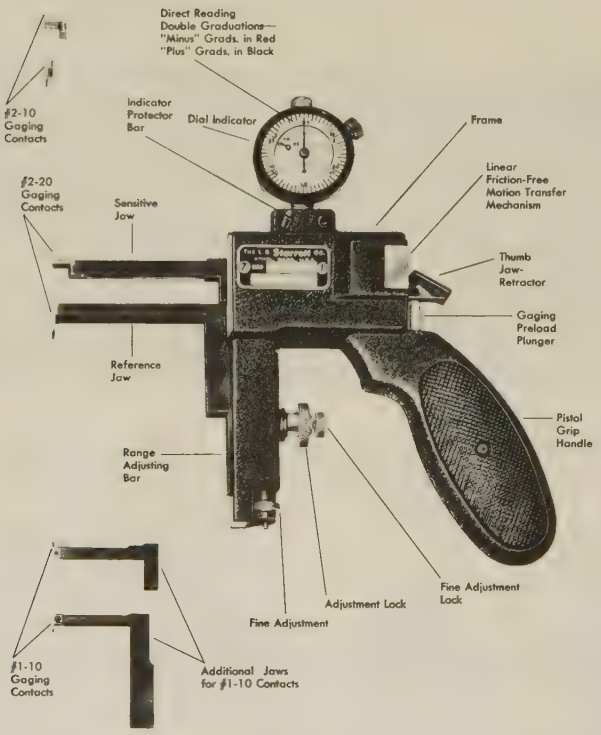
This gage was designed in collaboration with the Hartford Steam Boiler Inspection and Insurance Company. It is known as the Hartford Steam Boiler Engine Strain Gage and is used by their inspectors to check the distortion of engine shafts and frames as shown.

Cat. No.	EDP No.	Range	Description	Dial Indicator		
				Graduation	Dial Reading	Range One Rev.
696Z	52901	2-3/8 to 18"	Strain Gage with Balancing Attachment	.001"	0-20-0	.040"
696MZ	52902	61 to 458 mm	Metric Strain Gage with Balancing Attachment	0.01 mm	0-50-0	1 mm
696B	52903	—	Balancing Attachment only	—	—	—

Nos. 696Z and 696MZ furnished with sharp points and with No. 696B Balancing Attachment in attractive, protective case. Packed one in a box.

Dial Indicator Groove Gage No. 1175

Range .375 to 6 Inches



This lightweight, hand-operated gage is for in-process or bench inspection of oil grooves, snap ring retainer grooves, "O" ring seat retainer grooves and similar internal recesses. It is also useful for checking bore dimensions and revealing the presence of taper, bell-mouth and out-of-roundness.

Press the thumb lever to bring the parallel-retracting sensitive jaw toward the reference jaw. Insert the jaws into the bore. Release the lever to let the gaging contacts seat in the groove. Then read plus or minus dimensions directly from the dial indicator which has a double row of graduations reading in opposite directions from zero—"minus" graduations in red and "plus" graduations in black. The indicator can be rotated 360° and locked in position to read from any angle desired.

The gage consists of a pistol grip frame with gaging contacts mounted on a reference jaw and a sensitive jaw. The sensitive gaging contact, which has a 1/2" retractable range, transfers the work dimension through a linear friction-free transfer mechanism to the dial indicator. Since the lower reference jaw is fixed, it supports the entire weight of the gage and the operator's hand, thus preventing incorrect gaging pressure and false readings.

The reference jaw can be mounted in two positions on the range adjusting bar. The bar itself is also adjustable in a grooved extension of the frame, and after locking in approximate position, can be adjusted to the nominal I.D. by a fine adjustment screw. A lock is also provided for this final setting.

To handle the entire range of .375" to 6" I.D., with a gaging depth of 2-1/2", the gage is supplied with two sets of jaws, both readily interchangeable. Three sets of contacts are furnished. These attach to the ends of the jaws and can be removed and replaced by other contacts without replacing the entire jaw. Contacts have flush ends so that grooves at the bottom of blind holes can be gaged without interference. The contacts are hardened steel with a hard chrome finish for long life.

NOTE. Special long 4" and 6" reach jaws and range extension bar 6" to 12" available on request. Special and/or modification of gaging contacts and jaws normally furnished will be quoted on request. Please submit a print or sketch showing all pertinent dimensions. Dial indicators graduated in .001", dial reading plus 0-30 and minus 0-30 also available.

Setting Instructions

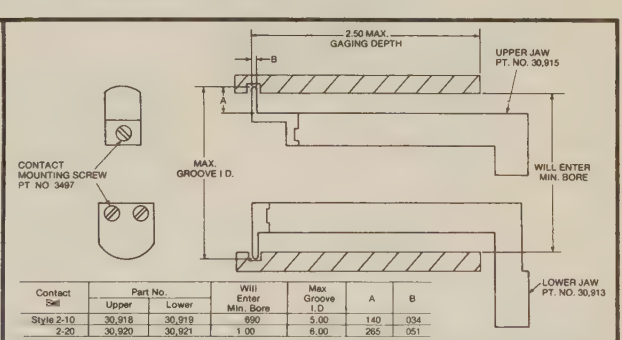
1. Select jaws and contacts to suit the I.D. to be gaged. Mount them on the adjusting bar. Adjust the reference jaw to approximate dimension and lock in position.
2. Select gage blocks for the required I.D. (Other methods such as vernier calipers, outside micrometers, ring gages also may be used depending on tolerances.)
3. Set the gage to the gage blocks and adjust the reference jaw by means of the fine adjustment so that the dial indicator reads approximately zero. Lock the fine adjustment and set the indicator to zero by rotating its bezel.
4. The gage is now ready for measuring internal diameters.

Cat. No.	EDP No.	Range	Dial Indicator No.	Graduation	Dial Reading	Range
1175Z	53173	.375" to 6"	81-136-622J	.0005"	+0-30 −0-30	.060"

NOTE: also available in metric.
Furnished with jewel bearings in case.
Packed one in a box.

CONTACT SET SPECIFICATIONS

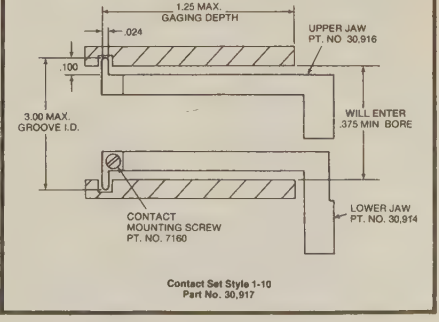
FOR GENERAL PURPOSE GAGING OF INTERNAL GROOVES



Contact Set	Part No. Upper	Part No. Lower	Will Enter Min. Bore	Max Groove I.D.	A	B
Style 2-10	30,918	30,919	.690	5.00	.140	.034
2-20	30,920	30,921	1.00	6.00	.265	.051

To gage internal snap ring retainer grooves and internal "O" ring rubber seal retainer grooves use of the following Contact Styles are suggested.

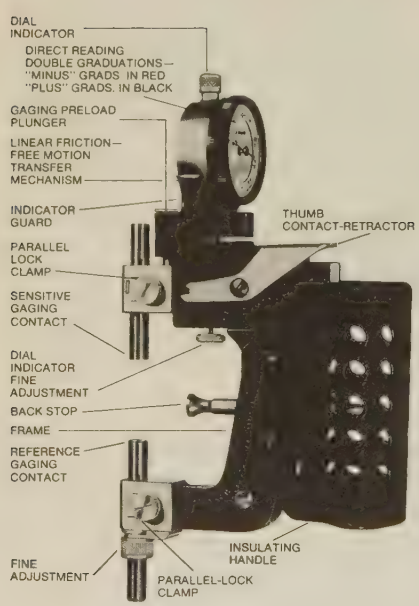
Contact Style	Internal Snap Ring Truarc Series 5000, 5001, 5002, 5008 No.'s or Equal	"O" Ring Seal Series 6227 Dash No.'s or Equal
1-10	No. 37-75	No. 7-14
2-10	No. 77-150	No. 15-27
2-20	No. 156-600	No. 28-64



Contact Set Style 1-10
Part No. 30,917

Dial Indicator Snap Gage
No. 1150 Series

Four models for gaging outside diameters from 0-2 inches, 2-4 inches, 4-6 inches, 6-8 inches

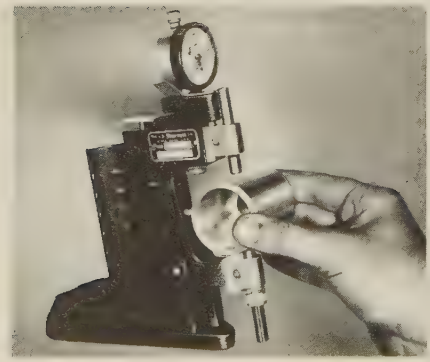


No. 1150 as hand held snap gage (above) and with stand as bench comparator

These compact, slim profile gages have rigid aluminum alloy frames protected from hand heat by insulating handles. They are used at the machine or in the inspection department for gaging outside diameters from 0 to 8" to an accuracy of .0001".

Dimensional variations are transmitted to the dial indicator through a linear friction-free transfer mechanism totally enclosed for protection against side thrust, foreign matter and coolants. Flat gaging contacts simplify measurement close to shoulders, and the sensitive contact, which is raised by a frame-mounted thumb lever, may be reversed to present a spherical face to the work. An adjustable back stop simplifies centering the work between the gaging contacts.

The contacts and back stop are 5/16" diameter hardened tool steel, precision ground and lapped flat. The contacts are individually adjustable to a maximum 2" range and are locked in position by tightening parallel-lock clamps which distribute clamping pressure uniformly to prevent cocking and maintain parallelism of faces. Both contacts are also keyed to maintain orientation of faces regardless of adjustment.



Plus or minus tolerances are read directly from the indicator since the dial face has a double row of graduations reading in opposite directions from zero—"minus" graduations in red and "plus" graduations in black. The indicator can be rotated 360° and locked in position to read from any angle, and a fine adjusting screw provides for zero setting the hand. A guard protects the dial indicator from damage when the gage is laid down on bench or machine.

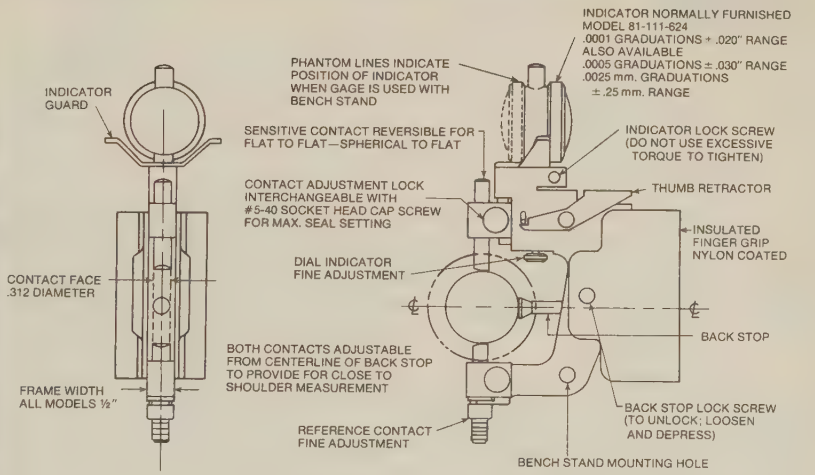
A bench stand is available to convert the gage to a bench comparator. The conversion is easily accomplished by a single screw which clamps the gage to the stand.

Specifications

Cat. No.	EDP No.	Range	Anvil Diameter	Dial Indicator			
				Graduation	Dial Reading	Range	Cat. No.
1150Z-2	53168	0-2"	5/16"	.0001"	plus 0-10 minus 0-10	.040"	81-111-624J
1150Z-4	53169	2-4"	5/16"	.0001"	plus 0-10 minus 0-10	.040"	81-111-624J
1150Z-6	53170	4-6"	5/16"	.0001"	plus 0-10 minus 0-10	.040"	81-111-624J
1150Z-8	53171	6-8"	5/16"	.0001"	plus 0-10 minus 0-10	.040"	81-111-624J
1150 (EDP No. 53172) Bench Stand extra							

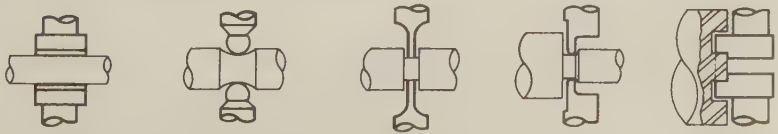
Furnished in case—packed one in a box.

NOTE: also available (1) with dial indicator other than listed, (2) with No. 812 Electronic Gage and Gaging Head in place of dial indicator, (3) with carbide faces on contacts, (4) with special contact and back stop shapes and sizes, (5) with variable gaging pressure control, (6) with AGD Type 3 disc setting masters or special setting masters and (7) in diameters larger than listed. *NOTE:* also available in metric.


INDICATOR NORMALLY FURNISHED
MODEL 81-111-624
.0001 GRADUATIONS + .020" RANGE
ALSO AVAILABLE
.0005 GRADUATIONS ± .030" RANGE
.0025 mm. GRADUATIONS
± .25 mm. RANGE
PHANTOM LINES INDICATE POSITION OF INDICATOR WHEN GAGE IS USED WITH BENCH STAND
INDICATOR GUARD
SENSITIVE CONTACT REVERSIBLE FOR FLAT TO FLAT—SPHERICAL TO FLAT
INDICATOR LOCK SCREW (DO NOT USE EXCESSIVE TORQUE TO TIGHTEN)
CONTACT ADJUSTMENT LOCK INTERCHANGEABLE WITH #5-40 SOCKET HEAD CAP SCREW FOR MAX. SEAL SETTING
THUMB RETRACTOR
INSULATED FINGER GRIP NYLON COATED
DIAL INDICATOR FINE ADJUSTMENT
CONTACT FACE .312 DIAMETER
BACK STOP
BOTH CONTACTS ADJUSTABLE FROM CENTERLINE OF BACK STOP TO PROVIDE FOR CLOSE TO SHOULDER MEASUREMENT
FRAME WIDTH ALL MODELS ½"
BACK STOP LOCK SCREW (TO UNLOCK; LOOSEN AND DEPRESS)
REFERENCE CONTACT FINE ADJUSTMENT
BENCH STAND MOUNTING HOLE

SPECIAL CONTACTS

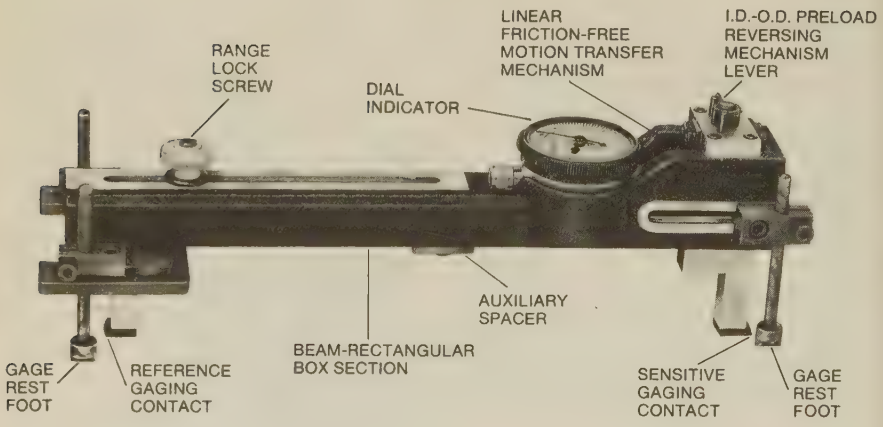
SOME OF THE MANY ANVIL CONFIGURATIONS DESIGNED TO SUIT SPECIAL APPLICATIONS. THEY CAN BE INTERCHANGED WITH ANVILS NORMALLY FURNISHED WITH No. 1150 SERIES DIAL SNAP GAGE.



WIDE FACE UP TO 9/16" SQUARE | BALL OR ROLL | BLADE TYPE | OFFSET | OFFSET FOR FACE GROOVE

Dial Indicator Diameter Gage
No. 1102 (EDP No. 56134)

Range 1 to 12 Inches—Outside and Inside



This gage measures shallow outside and inside diameters by comparing dimensions to gage blocks or to an adjustable setting master. The gage consists of a rectangular box beam with a sensitive gaging contact at one end and a reference gaging contact at the other.

The sensitive contact transfers dimensions to the dial indicator through a linear friction-free mechanism. The reference contact has an 11" range of adjustment along the beam. Two gage rest feet at the reference end of the gage and one at the sensitive end provide for staging the gage on the work and for correctly aligning the contacts. Gaging depth is set within a range of 0-1" by adjusting the gage rest feet up or down.

The dial indicator graduation is .0005", its total range ±.030". It has a double row of graduations reading in opposite directions from zero—"minus" graduations in red and "plus" graduations in black.

A lever-actuated reversing mechanism loads the gage for inside or outside diameter measurements. The gaging contacts are easily changed to ID or OD gaging by unscrewing and turning them individually end-for-end on their carrier bars.

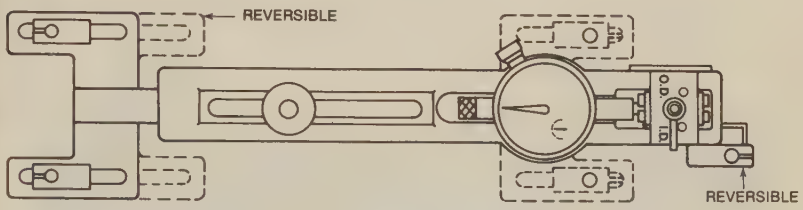
To prepare the gage for use, set the contacts directly to gage blocks; adjust the dial indicator to read zero; and set the gage rest feet to the selected work depth. Then use the gage to set a No. 1127 Master for a precise reference standard to use during production gaging.

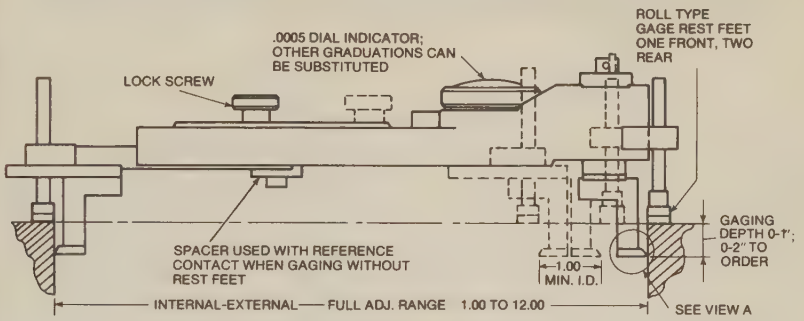
Specifications

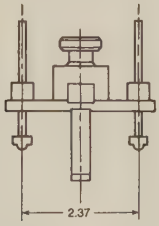
Adjustment range, internal . . . . . 1"-12"
Adjustment range, external . . . . . 1"-12"
Gage rest feet adjustment . . . . . 0-1"
Overall length . . . . . 9.8"
Approximate weight . . . . . 1 lb. 12 oz.
Dial indicator
Catalog number . . . . . No. 81-136-623
Graduation . . . . . .0005"
Dial reading . . . . . +0-10 with black figures running counterclockwise; —0-10 with red figures running clockwise
Range . . . . . ±.030"
Storage case . . . . available to hold gage and master

NOTE: also available (1) with dial indicator other than listed, (2) with No. 812 Electronic Gage and Gaging Head in place of indicator, (3) with special contact shapes, (4) for gaging at depth up to 2".
NOTE: also available in metric.

Dial Indicator Diameter Gage No. 1102 Continued

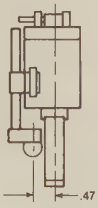



.0005 DIAL INDICATOR; OTHER GRADUATIONS CAN BE SUBSTITUTED
ROLL TYPE GAGE REST FEET ONE FRONT, TWO REAR
LOCK SCREW
GAGING DEPTH 0-1"; 0-2" TO ORDER
SPACER USED WITH REFERENCE CONTACT WHEN GAGING WITHOUT REST FEET
1.00 MIN. I.D.
INTERNAL-EXTERNAL— FULL ADJ. RANGE 1.00 TO 12.00
SEE VIEW A

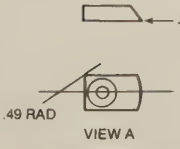


ROLL TYPE GAGE REST FEET
TWO AT REFERENCE END (LEFT),
ONE AT SENSITIVE END (RIGHT).

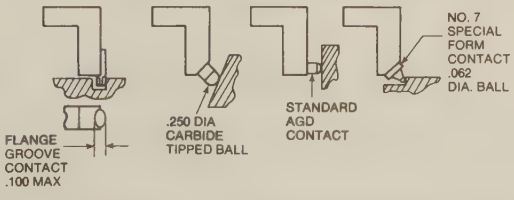
NOTE: SPECIAL CONFIGURATIONS DESIGNED TO ORDER.



STANDARD CONTACTS FURNISHED WITH GAGE



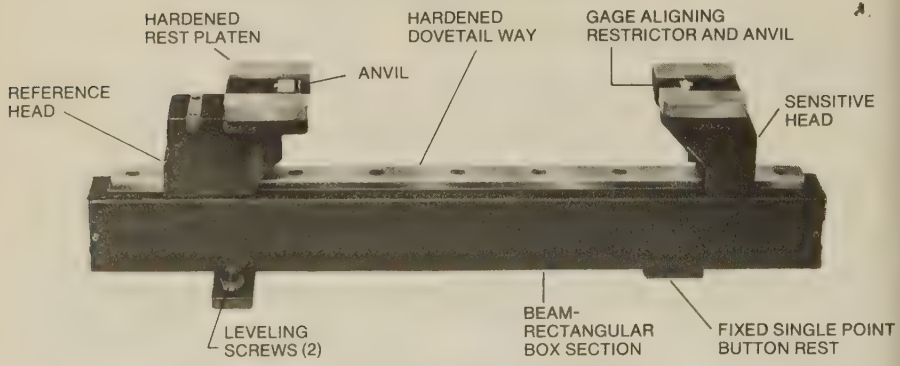
SPECIAL CONTACTS DESIGNED TO ORDER



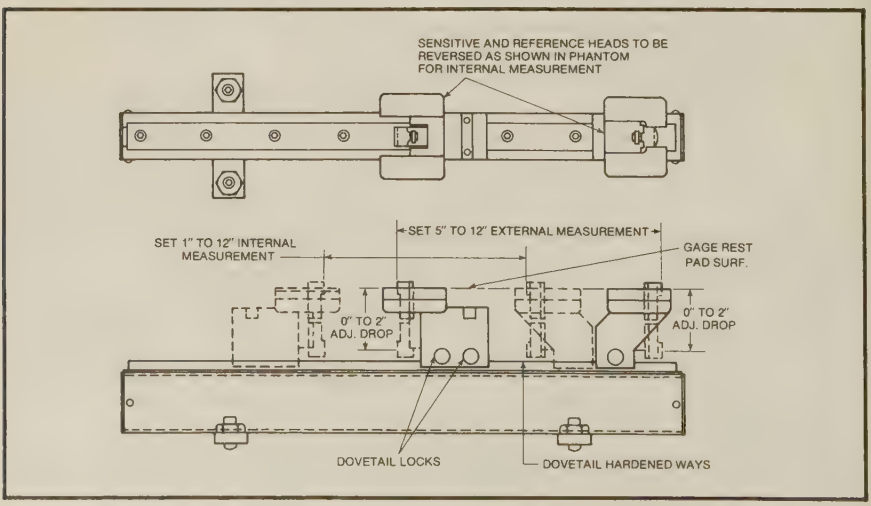
Internal-External Adjustable Setting Master No. 1127

(EDP No. 56135)

For Use with No. 1102 Dial Indicator Diameter Gage

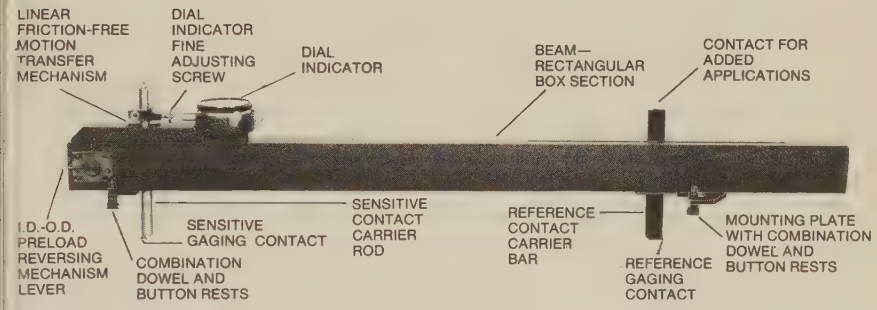


This setting master is used to check and reset No. 1102 Dial Indicator Diameter Gage under production gaging conditions. It consists of a rigid box beam with reference and sensitive heads individually adjustable along dovetail ways and secured in final position by lock screws. A platen on each head locates the diameter gage from its roll type gage rest feet, and the position of the gage contacts is established by precisely located anvils. The anvils are adjustable vertically, and the sensitive head anvil has a fine adjustment for final setting plus a restrictor to simplify positioning the gage on the master. Both heads can be reversed for ID or OD settings. A fixed single point button rest and two leveling screws provide a 3-point suspension. All contact and working surfaces are hardened and ground. Adjustment range 1-12" outside and inside; overall length 18-1/4", approximate weight 10-1/2 lbs. Storage cases are available to hold gage and master.


SENSITIVE AND REFERENCE HEADS TO BE REVERSED AS SHOWN IN PHANTOM FOR INTERNAL MEASUREMENT
SET 1" TO 12" INTERNAL MEASUREMENT
SET 5" TO 12" EXTERNAL MEASUREMENT
GAGE REST PAD SURF.
0" TO 2" ADJ. DROP
0" TO 2" ADJ. DROP
DOVETAIL LOCKS
DOVETAIL HARDENED WAYS

Dial Indicator Diameter Gage No. 1101 Series

Range 12 to 60 Inches—Outside and Inside


LINEAR FRICTION-FREE MOTION TRANSFER MECHANISM
DIAL INDICATOR FINE ADJUSTING SCREW
DIAL INDICATOR
BEAM—RECTANGULAR BOX SECTION
CONTACT FOR ADDED APPLICATIONS
I.D.-O.D. PRELOAD REVERSING MECHANISM LEVER
SENSITIVE GAGING CONTACT
COMBINATION DOWEL AND BUTTON RESTS
SENSITIVE CONTACT CARRIER ROD
REFERENCE CONTACT CARRIER BAR
REFERENCE GAGING CONTACT
MOUNTING PLATE WITH COMBINATION DOWEL AND BUTTON RESTS

These gages measure shallow outside and inside diameters by comparing dimensions to gage blocks or to an adjustable setting master. Each gage consists of a rectangular box beam with a sensitive gaging contact at one end and a reference gaging contact at the other.

The sensitive contact transfers dimensions to the dial indicator through a linear friction-free mechanism. The reference contact has a 6" range of adjustment along the beam. Both contact carriers are adjustable vertically to various work depths. Reversible dowel and button rests provide for staging the gage on the work and correctly aligning the contacts.

The dial indicator graduation is .0005", its total range .200". It has a double row of graduations reading in opposite directions from zero—"minus" graduations in red and "plus" graduations in black.

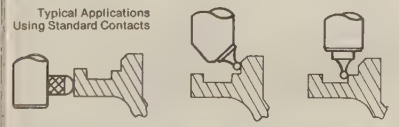
A lever-actuated reversing mechanism loads the gage for inside or outside diameter measurements. The gaging contacts are easily changed to I.D. or O.D. gaging by unscrewing and repositioning them on the reverse side of the carrier rod and bar respectively. Two styles of contacts are provided to suit various types of gaging surfaces.

To prepare the gage for use, set the contacts directly to gage blocks; adjust the dial indicator to read zero; and set the contact carriers to the selected work depth. Then use the gage to set a No. 1126 Master for a precise reference standard to use during production gaging.

Cat. No.	EDP No.	Adjustment Range		Gage Range	Gage Rest Adjustment		Overall Length	Approx. Weight	Dial Indicator	
		INTERNAL	EXTERNAL		MIN.	MAX.			Grad.	Dial Reading
1101-18	53144	12-18"	12-18"	±.050"	7⅞"	22½"	26"	4.5 lbs.	.0005"	+0-50, −0-50
1101-24	53146	18-24"	18-24"	±.050"	13⅞"	28½"	32"	4.9	.0005"	+0-50, −0-50
1101-30	53148	24-30"	24-30"	±.050"	19⅞"	34½"	38"	5.4	.0005"	+0-50, −0-50
1101-36	53150	30-36"	30-36"	±.050"	25⅞"	40½"	44"	5.9	.0005"	+0-50, −0-50
1101-42	53152	36-42"	36-42"	±.050"	31⅞"	46½"	50"	6.4	.0005"	+0-50, −0-50
1101-48	53154	42-48"	42-48"	±.050"	37⅞"	52½"	56"	6.9	.0005"	+0-50, −0-50
1101-54	53156	48-54"	48-54"	±.050"	43⅞"	58½"	62"	7.3	.0005"	+0-50, −0-50
1101-60	53158	54-60"	54-60"	±.050"	49⅞"	64½"	68"	7.8	.0005"	+0-50, −0-50

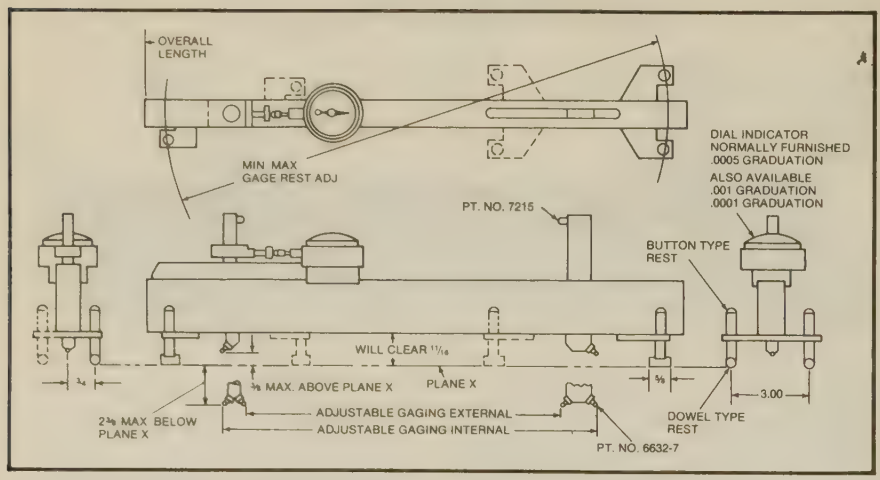
Storage cases available to hold gage and master.

Typical Applications Using Standard Contacts



NOTE: also available (1) with dial indicator other than listed, (2) with No. 812 Electronic Gage and Gaging Head in place of indicator, (3) with carbide contacts, (4) with special contact shapes, (5) for gaging at greater depths and (6) in ranges larger than listed.
NOTE: also available in metric.

Dial Indicator Diameter Gage No. 1101 Series—Cont.

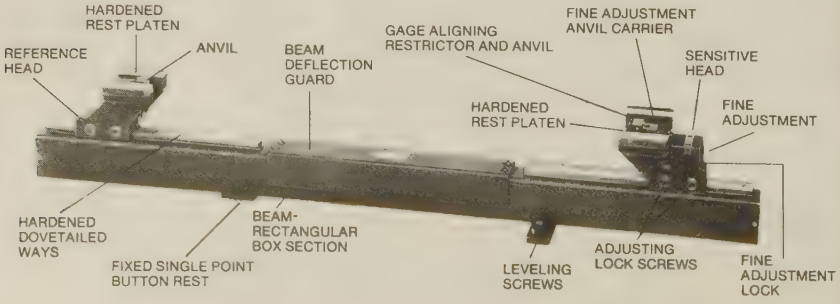


Internal-External Adjustable Setting Master No. 1126

Range 12 to 60 Inches—Outside and Inside

No. 1126 Setting Master is used to check and reset Nos. 1100 and 1101 Diameter Gages under production gaging conditions. It consists of a rigid box beam with reference and sensitive heads individually adjustable along dovetail ways and secured in final position by lock screws. A guard attached to the central section of the beam increases its rigidity, minimizing the possibility of deflection. A platen on each head locates the diameter gage from its rests, and the position of the gage contacts is established by precisely located anvils. The anvils are adjustable vertically, and the sensitive head anvil has a fine adjustment for final setting plus a restrictor to simplify positioning the gage on the master. Both heads can be reversed for I.D. or O.D. settings. A fixed single point button rest and two leveling screws provide a 3-point suspension. All contact and working surfaces are hardened and ground.

continued



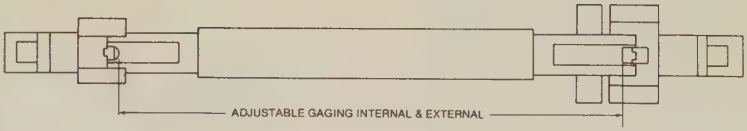
Internal-External Adjustable Setting Master No. 1126 Continued

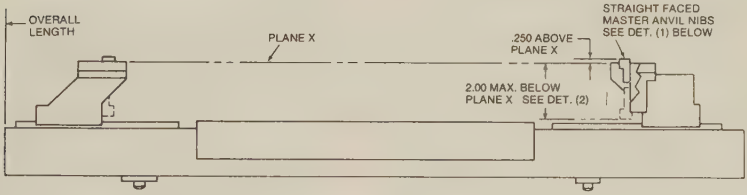
Cat. No.	EDP No.	Adjustment Range		Overall Length	Approx. Weight	Use with Catalog Nos.	
		INTERNAL	EXTERNAL				
1126-18	53160	12-18"	12-18"	25½"	12.4 lbs.	1100-18	1101-18
1126-24	53161	18-24"	18-24"	31½"	14.2	1100-24	1101-24
1126-30	53162	24-30"	24-30"	37½"	16	1100-30	1101-30
1126-36	53163	30-36"	30-36"	43½"	17.8	1100-36	1101-36
1126-42	53164	36-42"	36-42"	49½"	19.5	1100-42	1101-42
1126-48	53165	42-48"	42-48"	55½"	21.3	1100-48	1101-48
1126-54	53166	48-54"	48-54"	61½"	23.1	1100-54	1101-54
1126-60	53167	54-60"	54-60"	67½"	24.8	1100-60	1101-60

NOTE: setting masters for larger diameters available—price on application.

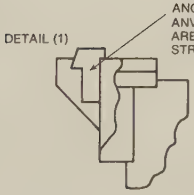
Storage cases available to hold gage and master.

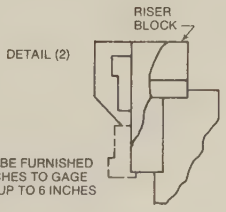
1126 Setting Master Set Up For Internal Gaging
Reverse Position of Heads For External Gaging





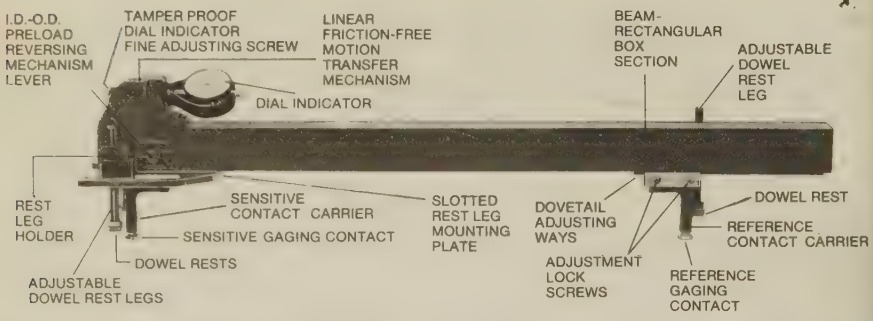
Angular or Conical Nibs and Riser Blocks
Quoted Upon Request


DETAIL (1)
ANGULAR OR CONICAL FACE MASTER ANVIL NIBS CAN BE FURNISHED AND ARE INTERCHANGABLE WITH THE STRAIGHT FACED NIBS


RISER BLOCK
DETAIL (2)
RISER BLOCK SETS CAN BE FURNISHED IN INCREMENTS OF 2 INCHES TO GAGE DEPTH SETTING RANGE UP TO 6 INCHES MAXIMUM

Heavy Duty Dial Indicator Diameter Gage No. 1100 Series

Range 12 to 60 Inches—Outside and Inside

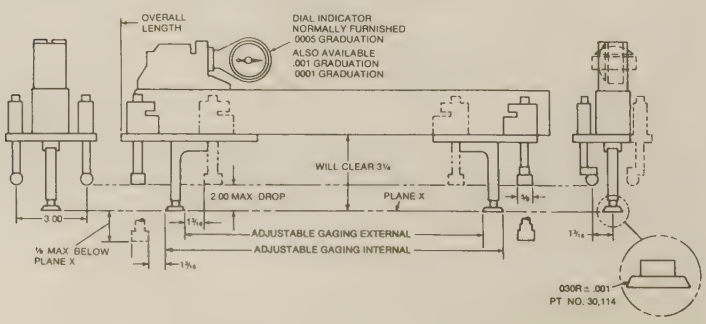


This gage combines heavy duty construction with adaptability to a wide range of internal and external measurements. Both contact carriers are reversible or may be replaced with special carriers. Two adjustable dowel-rest legs at the sensitive end of the gage and a third leg at the reference end ride on slotted mounting plates for longitudinal adjustment. The legs are individually adjustable vertically to obtain proper rest position of the gage on the work and correct alignment of the gaging contacts with the work. The sensitive gaging contact and the reference gaging contact are conical type, but may be modified to suit special gaging conditions. The indicator and its housing can be rotated through 360° so that the indicator may be read at the most convenient angle. Set the contacts to gage blocks; zero set the indicator; adjust to selected work depth—then use the gage to set a No. 1126 Master for reference use in production gaging.

Cat. No.	EDP No.	Adjustment Range		Gage Rest Adjustment		Overall Length	Approx. Weight	Dial Indicator		
		INTERNAL	EXTERNAL	MIN.	MAX.			Grad.	Dial Reading	Range*
1100-18	53128	12-18"	12-18"	8"	22 1/4"	21 5/8"	7.4 lbs.	.0005"	+0-50, −0-50	±.050"
1100-24	53130	18-24"	18-24"	14"	28 1/4"	27 5/8"	8.0	.0005"	+0-50, −0-50	±.050"
1100-30	53132	24-30"	24-30"	20"	34 1/4"	33 5/8"	8.12	.0005"	+0-50, −0-50	±.050"
1100-36	53134	30-36"	30-36"	26"	40 1/4"	39 5/8"	9.8	.0005"	+0-50, −0-50	±.050"
1100-42	53136	36-42"	36-42"	32"	46 1/4"	45 5/8"	10.4	.0005"	+0-50, −0-50	±.050"
1100-48	53138	42-48"	42-48"	38"	52 1/4"	51 5/8"	11.0	.0005"	+0-50, −0-50	±.050"
1100-54	53140	48-54"	48-54"	44"	58 1/4"	57 5/8"	11.12	.0005"	+0-50, −0-50	±.050"
1100-60	53142	54-60"	54-60"	50"	64 1/4"	63 5/8"	12.8	.0005"	+0-50, −0-50	±.050"

*Installed on gage.

NOTE: also available with special options listed under description of No. 1101 Series Diameter Gage.
Roller rest legs for friction free action available on request.
NOTE: also available in metric.
Storage cases available to hold gage and master.



Starrett®

Webber Gage Blocks and Digital Measuring Tools

Starrett-Webber Quality

Your Assurance of Dimensional Accuracy Year After Year

Precision gage blocks are the primary standards vital to dimensional quality control in the manufacture of interchangeable parts. The Webber Division of Starrett manufactures them in both English and metric systems to the Federal Specifications and in the Federal Accuracy Grades listed below.

Flatness, Parallelism. Gaging surfaces of Webber blocks are laboratory inspected for flatness and parallelism. This calls for careful grinding and lapping until the precise size is achieved and inspection through an optical flat reveals the desired pattern.

Stability. Dimensional stability is that characteristic of a gage block which enables it to maintain its original dimension indefinitely. Webber gage blocks do not change their size except through normal wear. Through 50 years of experience, Webber has mastered the art of imparting stability to blocks.

Surface Finish. The finer the surface finish, the easier gage blocks can be "wrung." Webber standards of surface finish are actually higher than government requirements. With chrome carbide blocks, a surface finish registering between .1 and .3 microinch AA is achieved.

Hardness. Webber steel gage blocks have a Rockwell hardness of 65 ± 1/2 "C" scale. Automatically controlled furnaces and quenching baths assure uniform hardness and proper grain structure. Webber chrome carbide gage blocks have a hardness of RC 71-73 and an unusually fine hard grain structure which gives them a lifetime of resistance to wear and abrasion.

Accuracy. Webber steel gage blocks in Grade 2 and **croblox** (chrome carbide) gage blocks in Grades 0.5, 1, 2 and 3 meet or exceed Federal Specifications. Material co-efficients of thermal expansion are: chromium carbide—4.7 x 10^{-6} in./°F/in. (8.4 x 10^{-6} mm/°C/mm); SAE 52100 tool steel—6.4 x 10^{-6} in./°F/in. (11.5 x 10^{-6} mm/°C/mm.

Specifications. Webber Gage Division Products are manufactured and inspected in accordance with Mil-C-45662-A, Mil-I-45208A and Mil-Q-9858 as well as the stability requirements of Table VII—Federal Specification GGG-G-15.

Federal Accuracy Grades

Accuracy Grade	Former Designation	Tolerance — English System (Inch)	Tolerance — Metric System (Millimeter)
0.5	AAA	±.000001"	±.00003 mm
1	AA	±.000002"	±.00005 mm
2	A+	+.000004"	+.0001 mm
		−.000002"	−.00005 mm
3	A&B	+.000006"	+.00015 mm
		−.000002"	−.00005 mm

Reference Temperature: 68°F (20°C)
One Inch = 25.4 millimeters exactly

How to Order

Gage Block Sets

(Use catalog number for block range and selection)

1. Specify style, material and accuracy grade.
2. Is a Certificate of Inspection* required? Certificate provides individual readings on each block. If yes, customer's name is required.
3. Is etched serial number required? 5 digit maximum. If yes, customer's name required.

Individual Gage Blocks

1. Specify style, material, size and accuracy grade.
2. Is a Certificate of Inspection* required? Certificate provides individual readings on each block. If yes, customer's name is required.
3. Is etched serial number required? 5 digit maximum. If yes, customer's name required.
4. .050", .100" and .150" (1 mm and 2 mm metric) sizes in rectangular style are available in wear length (1.180") and long length (1.380") depending on set selection. Specify length wanted.

*Webber Division gage block shipments include a Certification of Standards which verifies traceability to the National Bureau of Standards. For individual readings on each block, however, the optional Certificate of Inspection must be ordered.

Catalog Number Examples

English System

SETS	INDIVIDUAL BLOCKS
*RS 81. A1	RS 1.000. A1
R—Rectangular Style	R—Rectangular Style
S—Steel Material	S—Steel Material
81—No. of blocks in set	1.000—Size
A1—A+ Accuracy Grade	A1—Accuracy Grade
*SC 34. AA	SC .500. AA
S—Square Style	S—Square Style
C—**croblox** Material	C—**croblox** Material
34—No. of blocks in set	.500—Size
AA—AA Accuracy Grade	AA—Accuracy Grade
*HD 46. A1	HD 2.000. A1
HD—Heavy Duty Style	HD—Heavy Duty Style
46—No. of blocks in set	2.000—Size
A1—A+ Accuracy Grade	A1—Accuracy Grade
AG 18. TR	AG 30. DTR
AG—Angle Gages	AG—Angle Gage
18—No. of blocks in set	30D—30 Degree
TR—Tool Room Accuracy	TR—Accuracy Grade

Metric System

SETS	INDIVIDUAL BLOCKS
RC 88. MA1	RSM 1.0. A1
R—Rectangular Style	R—Rectangular Style
C—**croblox** Material	S—Steel Material
88—No. of blocks in set	M—Metric System
M—Metric System	1.0 mm—Size
A1—A+ Accuracy	A1—A+ Accuracy Grade
S2S 45. MA1	SCM 2.01. AA
S—Square Style	S—Square Style
2—2 mm Base	C—**croblox** Material
S—Steel Material	M—Metric System
45—No. of blocks in set	2.01—Size
M—Metric System	AA—Accuracy Grade
A1—A+ Accuracy Grade	

NOTE: Size of rectangular gage blocks—less than .050" thick, .357" wide x 1.115" long; .050" to .200" thick, 1.180" long; .200" thick and up, 1.380" long. Square gage blocks—all .950" x .950". Heavy duty style—all 17/32" x 1-1/2".

*Addition of letter "X" after catalog number indicates set furnished with accessories.

For complete EDP number information, refer to Webber Gage Division.

Inspection Service

In sending gage blocks to the Webber Gage Division for inspection, please specify whether we are to (A) inspect, issue certificate and return only; (B) inspect, advise condition and hold for instructions; or (C) inspect, replace worn blocks and return. If order specifies that worn blocks should be replaced, and the cost of replacement approaches that of a new set, we will so inform you, quote prices and wait for instructions. For more information on inspection procedures, see pages 397, 398.

New Standards of Accuracy

Starrett-Webber Grades meet or exceed U.S. GGG-G-15 Specifications.
Starrett-Webber Grades 0.5 and 1 surpass British Reference Grade.
Starrett-Webber Grades 0.5, 1 and 2 surpass German Grade O.

ENGLISH SYSTEM

	Laboratory Master Fed. Accuracy Grade 0.5‡		Webber AA Fed. Accuracy Grade 1‡		Webber A+ Fed. Accuracy Grade 2‡		Webber A Fed. Accuracy Grade 3‡	
Inches	Length	Flatness and Parallelism	Length	Flatness and Parallelism	Length	Flatness and Parallelism	Length	Flatness and Parallelism
Thru 1	±.000001"	.000001"	±.000002"	.000002"	+.000004" −.000002"	.000003"	+ 000006" −.000002"	.000004"
2	± 000002"	000001"	± 000004"	.000002"	+.000008" −.000004"	.000003"	+ 000012" −.000004"	.000004"
3	±.000003"	.000001"	±.000005"	.000002"	+.000010" −.000005"	.000003"	+.000015" −.000006"	.000004"
4	± 000004"	000001"	± 000006"	.000002"	+ 000012" −.000006"	.000003"	+.000020" −.000008"	.000004"
5					+.000014" −.000007"	.000004"	+ .000028" −.000014"	.000005"
6					+.000016" −.000008"	.000004"	+.000032" −.000016"	.000005"
7					+.000018" −.000009"	.000004"	+.000036" −.000018"	.000005"
8					+.000020" −.000010"	.000004"	+.000040" −.000020"	.000005"
10					+.000024" −.000012"	.000005"	+.000048" −.000024"	.000006"
12					+.000028" −.000014"	.000005"	+.000056" −.000028"	.000006"
16					+.000036" −.000018"	.000005"	+.000072" −.000036"	.000006"
20					+.000040" −.000020"	.000005"	+.000080" −.000040"	.000006"
Surface Finish	Equal to Quartz Flat		1 to .3 Microinch Arithmetic Average		.6 to .8 Microinch Arithmetic Average*		.8 Microinch Arithmetic Average	

METRIC SYSTEM

	Laboratory Master Fed. Accuracy Grade 0.5‡		Webber AA Fed. Accuracy Grade 1‡		Webber A+ Fed. Accuracy Grade 2‡		Webber A Fed. Accuracy Grade 3‡	
Millimetres	Length	Flatness and Parallelism	Length	Flatness and Parallelism	Length	Flatness and Parallelism	Length	Flatness and Parallelism
Thru 25	±.00003mm	.00003mm	±.00005mm	.00005mm	+.0001mm −.00005mm	00008mm	+.00015mm −.00005mm	.0001mm
25 thru 50	±.00005mm	.00003mm	±.0001mm	.00005mm	+.00015mm −.0001mm	.00008mm	+.0003mm −.0001mm	.0001mm
50 thru 75	±.00008mm	.00003mm	±.00013mm	.00005mm	+.00025mm −.00015mm	00008mm	+.00045mm − 00015mm	.0001mm
75 thru 100	±.0001mm	.00003mm	±.00015mm	.00005mm	+.0003mm −.00015mm	.00008mm	+.00055mm − 0002mm	.0001mm
Surface Finish	Equal to Quartz Flat		.000003mm to .000008mm	Arithmetic Average	.000015mm to .00002mm	Arithmetic Average**	00002mm Arithmetic Average	

*Surface Finish—Grade 2 (A+) English **crobilx** .3 Microinch AA (Arithmetic Average)

Surface Finish—Grade 2 (A+) Metric **crobilx .000008mm AA (Arithmetic Average)

Starrett Webber tolerances are guaranteed to meet or exceed those of Federal Specification GGG-G-15. British Standard 4311:1968 and 888; 1950 and German Standard DIN 861-1959.

‡Number Grade Designations:

Federal Accuracy	(Inch)	(Metric)
Grade 0.5 (Formerly AAA)	±.000001"	(±.00003mm)
1 (Formerly AA)	±.000002"	(±.00005mm)
2 (Formerly A+)	+.000004"	(+.0001mm)
	−.000002"	(−.00005mm)
3 (Formerly A & B)	+.000006"	(+.00015mm)
	−.000002"	(−.00005mm)

Reference Temperature—68°F (20°C)
One Inch = 25.4 millimeters exactly

English System

Rectangular croblox® Gage Block Sets in Case

Catalog No.	Acc.† Grade	Accuracy in Millionths of an Inch	Blocks Per Set	Range	Blocks Included in Sets
RC 81. A1	2	+4 −2	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	9 blocks .1001 thru .1009 (steps of .0001) 49 blocks .101 thru .149 (steps of .001) 19 blocks .050 thru .950 (steps of .050) 4 blocks 1.000 thru 4.000 (steps of 1 inch)
RC 81. AA	1	±2	81		
RC 81 LM	0.5	±1	81		
RC 84. A1	2	+4 −2	84	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025"	Same as in RC 81. set, plus 3 blocks .100025, .10005, .100075
RC 84. AA	1	±2	84		
RC 85 A1	2	+4 −2	85	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" 1/16" to 12.000" in steps of 1/64"	Same as in RC 81. set, plus 4 blocks 1/16, 3/64, 1/32, 1/64
RC 85 AA	1	±2	85		
RC 88. A1	2	+4 −2	88	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025" 1/16" to 12.000" in steps of 1/64"	Same as in RC 81. set, plus 3 blocks .100025, .10005, .100075 4 blocks 1/16, 3/64, 1/32, 1/64
RC 88 AA	1	±2	88		
RC 88. LM	0.5	±1	88		
RC 33. A1	2	+4 −2	33	.200" to 4.000" in steps of .001" .300" to 4.000" in steps of .0001"	9 blocks .1001 thru .1009 (steps of .0001) 9 blocks .101 thru .109 (steps of .001) 9 blocks .110 thru .190 (steps of .010) 3 blocks .100 thru .300 (steps of .100) 1 block .500 1 block 1.000 1 block 2.000
RC 33. AA	1	±2	33		
RC 36. A1	2	+4 −2	36	.100" to 4.000" in steps of .001" .150" to 4.000" in steps of .0001" .200" to 4.000" in steps of .00005"	1 block .05005 9 blocks .0501 thru .0509 (steps of .0001) 9 blocks .051 thru .059 (steps of .001) 11 blocks .050 thru .150 (steps of .010) 4 blocks .200 thru .500 (steps of .100) 1 block 1.000 1 block 2.000
RC 36. AA	1	±2	36		
RC 28. A1	2	+4 −2	28	.020" to .240" in steps of .001" .040" to .240" in steps of .0001" .060" to .240" in steps of .00005"	1 block .02005 9 blocks .0201 thru .0209 (steps of .0001) 9 blocks .021 thru .029 (steps of .001) 9 blocks .010 thru .090 (steps of .010)
RC 28. AA	1	±2	28		
RC 28. LM	0.5	±1	28		
RC 21. LM	0.5	±1	21	.100" to .1001" in steps of .000005"	1 block .100 20 blocks .100005 thru .1001 (steps of .000005)
RC 11. LM	0.5	±1	11	.100" to .1001" in steps of .000010"	1 block .100 10 blocks .100010 thru .1001 (steps of .000010)

NOTE: 81, 84, 85 and 88 block sets with Accuracy Grades 2 or 1 accuracy also available with accessories at extra cost (see page 378). To order add "X" to the catalog number.

NOTE: Sets available with etched serial numbers or Certificate of Inspection at extra cost. Grade 0.5 sets must be purchased with etched serial numbers and Certificate of Inspection at extra cost.

†Number Grade Designations—
Federal Accuracy Grade 0.5 (Formerly AAA) (±.000001")
1 (Formerly AA) (±.000002")
2 (Formerly A+) (+.000004" −.000002")
3 (Formerly A) (+.000006" −.000002")

English System
Rectangular Steel Gage Block Sets in Case

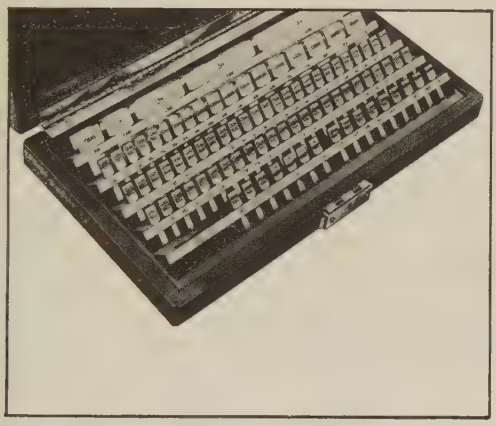
Catalog No.	Accuracy Grade	Blocks Per Set	Range	Blocks Included in Sets
RS 81 A1	ALL GRADE 2 +.000004" −.000002"	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001	9 blocks .1001 thru .1009 (steps of .0001) 49 blocks .101 thru .149 (steps of .001) 19 blocks .050 thru .950 (steps of .050) 4 blocks 1.000 thru 4.000 (steps of 1 inch) Above set also available with Accessories (extra)
RS 84 A1		84	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .00005"	Same as in RS81A1 set plus: 2 blocks .100" wear, **croblox** 1 block .10005" Above set also available with Accessories (extra)
RS 85 A1		85	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" 1/16" to 12.000" in steps of 1/64"	Same as in RS81A1 set plus: 4 blocks 1/16, 3/64, 1/32, 3/64 Above set also available with Accessories (extra)
RS 86 A1		86	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025"	Same as in RS81A1 set plus: 3 blocks .100025", .10005", .100075" 2 blocks .100" wear, **croblox** Above set also available with Accessories (extra)
RS 88. A1		88	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025" 1/16" to 12.000" in steps of 1/64"	Same as in RS81A1 set plus: 3 blocks .100025", .10005", .100075" 4 blocks 1/16, 3/64, 1/32, 3/64 Above set also available with Accessories (extra)
RS 92. A1		92	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025" 1/16" to 12.000" in steps of 1/64"	Same as in RS88A1 set plus: 2 blocks .100" wear, **croblox** 2 blocks .050" wear, **croblox** Above set also available with Accessories (extra)
RS 43. A1		43	.200" to 10.000" in steps of .001" .300" to 10.000" in steps of .0001" .400" to 10.000" in steps of .00005"	1 block .10005 2 blocks .100 wear, **croblox** 9 blocks .1001 thru .1009 (steps of .0001) 9 blocks .101 thru .109 (steps of .001) 9 blocks .110 thru .190 (steps of .010) 9 blocks .100 thru .900 (steps of .100) 4 blocks 1.000 thru 4.000 (steps of 1 inch)
RS 38. A1		38	.100" to 4.000" in steps of .001" .150" to 4.000" in steps of .0001" .200" to 4.000" in steps of .00005"	2 blocks .050 wear, **croblox** 1 block .05005 9 blocks .0501 thru .0509 (steps of .0001) 9 blocks .051 thru .059 (steps of .001) 11 blocks .050 thru .150 (steps of .010) 4 blocks .200 thru .500 (steps of .100) 2 blocks 1.000 and 2.000
RS 36. A1		36	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	2 blocks .100 wear, **croblox** 9 blocks .1001 thru .1009 (steps of .0001) 9 blocks .101 thru .109 (steps of .001) 9 blocks .110 thru .190 (steps of .010) 4 blocks .100, .200, .300, .500 3 blocks 1.000, 2.000, 4.000
RS 28. A1		28	.020" to .240" in steps of .001" .040" to .240" in steps of .0001" .060" to .240" in steps of .00005"	1 block .02005 9 blocks .0201 thru .0209 (steps of .0001) 9 blocks .021 thru .029 (steps of .001) 9 blocks .010 thru .090 (steps of .010)
RS 9. A1		9	.0625" to 4.000" in steps of .0625" .100" to 4.000" in steps of .100"	1 block .0625 1 block .100 1 block .125 2 blocks .200 and .250 1 block .300 1 block .500 2 blocks 1.000 and 2.000
RS 5. A1		5	.0625" to 1.9375" in steps of .0625"	1 block .0625 1 block .125 1 block .250 1 block .500 1 block 1.000

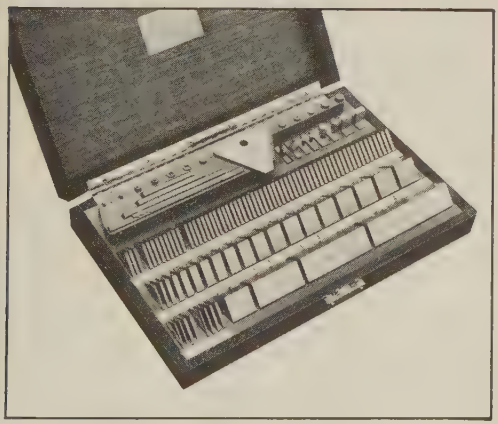
NOTE: 81, 84, 85, 86, 88 and 92 block sets also available with accessories at extra cost (see page 378). To order, add "X" to catalog number.

NOTE: Sets available with etched serial numbers or Certificate of Inspection at extra cost.

Combination croblox® and Steel Grade 3† Gage Block Sets

Long Range Economy
In both Rectangular and Square Style





Chrome Carbide Performance and Superiority

Another Starrett-Webber First—offering a Grade A Gage Block Set with **croblox**® (chrome carbide) material in the sizes thru 1" and Standard Steel in the 2", 3" and 4" sizes. This combination of materials, providing long-wearing **croblox** in the blocks most commonly used, gives a complete set of blocks at an economical price.

1 Long-Wearing . . .

10 to 30 times the wear life of stainless steel or chromium plate. 30 to 70 times that of steel.

2 Wringability . . .

Webber **croblox** is far superior to any other gage block material.

3 Corrosion-Resistant . . .

10 to 20 times more corrosion-resistance than 18-8 stainless steel.

4 Compare Price . . .

Webber GRADE 3 **croblox** is substantially less than tungsten carbide and compares favorably with steel or chrome plate.

†Number Grade Designations—
Federal Accuracy Grade 0.5 (Formerly AAA) (±.000001")
1 (Formerly AA) (±.000002")
2 (Formerly A+) (+.000004" −.000002")
3 (Formerly A) (+.000006" −.000002")

English System
Combination croblox® and Steel
Gage Block Sets in Case

Grade 3 croblox thru 1 Inch ($\pm\frac{.000006"}{.000002"}$)
Grade 2 Steel in the 2, 3 and 4 Inch ($\pm\frac{.000004"}{.000002"}$)

RECTANGULAR STYLE

Catalog Number	Blocks Per Set	Range	Blocks included in Set
RCS 81. A	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	9 blocks .1001" thru .1009" in .0001" steps—croblox 49 blocks .101" thru .149" in .001" steps—croblox 20 blocks .050" thru 1.000" in .050" steps—croblox 3 blocks 2.000", 3.000" and 4.000" —STEEL
RCS 81. AX	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	same as above plus accessories See page 385 for accessories included
RCS 34. A	34	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	9 blocks .1001" thru .1009" in .0001" steps—croblox 9 blocks .101" thru .109" in .001" steps—croblox 9 blocks .110" thru .190" in .010" steps—croblox 3 blocks .100" thru .300" in .100" steps—croblox 1 block .500" —croblox 1 block 1.000" —croblox 2 blocks 2.000" and 4.000" —STEEL

SQUARE STYLE

Catalog Number	Blocks Per Set	Range	Blocks included in Set
SCS 81. A	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	9 blocks .1001" thru .1009" in .0001" steps—croblox 49 blocks .101" thru .149" in .001" steps—croblox 20 blocks .050" thru 1.000" in .050" steps—croblox 3 blocks 2.000", 3.000" and 4.000" —STEEL
SCS 81. AX	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	same as above with accessories See Page 379 for accessories included
SCS 34. A	34	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	9 blocks .1001" thru .1009" in .0001" steps—croblox 9 blocks .101" thru .109" in .001" steps—croblox 9 blocks .110" thru .190" in .010" steps—croblox 3 blocks .100" thru .300" in .100" steps—croblox 1 block .500" —croblox 1 block 1.000" —croblox 2 blocks 2.000" and 4.000" —STEEL
SCS 34. AX	34	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	same as above with accessories See Page 378 for accessories included

Individual croblox®—Grade 3 Available in following sizes only—(Letter "A" is etched on each croblox)

.050" L**
.100" L**
.1001" thru .1009" in .0001" steps
.101" thru .149" in .001" steps
.150s"* thru .190" in .010" steps
.150" L**
.200" and .250"
.300"; .350"; .400"
.450" thru .750" in .050" steps
.800"
.850" thru 1.000"

Following Sizes furnished in "A+" Steel only in RCS and SCS sets
2.000"
3.000"
4.000"

*s—"Wear" Length 1.180"
**L—"Long" Length 1.380"
*—**Not applicable to Sq. Style

RCS and SCS sets available with Certificate of Inspection and Etched Serial Numbers at extra cost.

English System

Square croblox® Gage Block Sets in Case

Catalog No.	Accuracy Grade	Accuracy in Millionths of an Inch	Blocks Per Set	Range	Blocks Included in Sets
SC 81. A1	2	+4 −2	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	9 blocks .1001 thru .1009 (steps of .0001) 49 blocks .101 thru .149 (steps of .001) 19 blocks .050 thru .950 (steps of .050) 4 blocks 1.000 thru 4.000 (steps of 1 inch)
SC 81. AA	1	±2	81		
SC 84 A1	2	+4 −2	84	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025"	Same as in SC 81. set, plus 3 blocks .100025, .10005, .100075
SC 84. AA	1	±2	84		
SC 85. A1	2	+4 −2	85	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" 1/16" to 12.000" in steps of 1/64"	Same as in SC 81. set, plus 4 blocks 1/16, 3/64, 3/32, 7/64
SC 85 AA	1	±2	85		
SC 88. A1	2	+4 −2	88	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .000025" 1/16" to 12.000" in steps of 1/64"	Same as SC 81. set, plus 3 blocks .100025, .10005, .100075 4 blocks 1/16, 3/64, 3/32, 7/64
SC 88 AA	1	±2	88		
SC 34 A1	2	+4 −2	34	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	9 blocks .1001 thru .1009 (steps of .0001) 9 blocks .101 thru .109 (steps of .001) 9 blocks .110 thru .190 (steps of .010) 3 blocks .100 thru .300 (steps of .100) 1 block .500 1 block 1.000 1 block 2.000 1 block 4.000
SC 34 AA	1	±2	34		
SC 36. A1	2	+4 −2	36	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	Same as in SC 34. set, plus 1 block .050 1 block .400
SC 36. AA	1	±2	36		

NOTE: ALL SQUARE **croblox** sets above available with accessories at extra cost. To order, add "X" to catalog number. Accessories are furnished in steel.

NOTE: Sets available with etched serial numbers or Certificate of Inspection at extra cost.

INDIVIDUAL SQUARE GAGE BLOCKS

Below .050 and over 4.000 in Steel only

.010 .01005	.10025
.0101 thru .0109 in steps of .0001	.10005
.011 thru .019 in steps of .001"	.100075
.02005	.1001 thru .1009 in steps of .0001"
.020	.109375 (7/64)
.0201 thru .0209 in steps of .0001	.101 thru .109 in steps of .001"
.021 thru .029 in steps of .001	.110 thru .119 in steps of .001"
.030, .040, .050, .060	.120 thru .129 in steps of .001"
.0625 (1/16)	.130 thru .139 in steps of .001"
.070	.140 thru .149 in steps of .001"
.078125 (5/64)	.150 thru .950 in steps of .050"
.080	1.000" 5.000" 10.000"
.090	2.000" 6.000" 12.000"
.09375 (3/32)	3.000" 7.000" 16.000"
100	4.000" 8.000" 20.000"

NOTE: SQUARE Blocks available with etched serial numbers or Certificate of Inspection at extra cost.

NOTE: Size of Square Gage Blocks—.950" square (17/64" hole in center).

SQUARE GAGE BLOCK ACCESSORIES

Description	Quantity	STEEL Catalog No.	croblox (Optional) Catalog No.
Half-round jaws .125 radius	1 Pr.	SA 1.	SA 21.
Half-round jaws .250 radius	1 Pr.	**SA 2.	SA 22.
Straight jaws .500 thick	1 Pr.	SA 3.	SA 23.
Scriber point	1	**SA 4.	
Center point	1	SA 5.	
Base block	1	SA 6.	
Knurled screws	2	**SA 7.	
Studs	2	**SA 8.	
Flat head screws (long) 1¼"	2	**SA 9.	
Flat head screws (short) ⅝"	2	**SA 10.	
Slotted nuts	2	**SA 11	
Tie rod—½" long (solid)	1	**SA 12.	
Tie rod—1½" long (solid)	1	**SA 13.	
Tie rod—2¼" long (solid)	1	**SA 14.	
Tie rod—3" long (solid)	1	**SA 15.	
Tie rod—4½" long (adj.)	1	**SA 16.	
Tie rod—6" long (adj.)	1	SA 17.	
Tie rod—11¾" (solid)	1	SA 18.	
Tie rod—15¾" (solid)	1	SA 19.	
Tie rod—19¾" (solid)	1	SA 20.	
Case only	1	CS 9168	

Items SA 1. thru SA 17. are included in 81 thru 88 block sets ordered with accessories.

**Items with double asterisks (in steel) are included in 34 and 36 block sets purchased with accessories.

Long block set SS 8. AIX furnished with 6 each SA 8. Studs, 2 each SA 9. Screws, 2 each SA 10. Screws, one each SA 16. thru SA 19. Tie Rods and 2 each SA 20. Tie Rods.

English System

Square Steel Gage Block Sets in Case

Catalog No.	Accuracy Grade	Blocks Per Set	Range	Blocks Included in Sets
SS 81 A1	ALL GRADE 2	81	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001"	9 blocks .1001" thru .1009" (steps of .0001") 49 blocks .101" thru .149" (steps of .001") 19 blocks .050" thru .950" (steps of .050") 4 blocks 1.000" thru 4.000" (steps of 1 inch") Above set also available with ACCESSORIES** (extra)
SS 84 A1	+ .000004" −.000002"	84	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .00005"	Same as in SS 81. A1 set, plus — 3 blocks .100025, .10005, .100075 Above set also available with ACCESSORIES** (extra)
SS 85 A1		85	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" ⅛" to 12.000" in steps of ⅛"	Same as in SS 81. A1 set, plus — 4 blocks ⅛, ¼, ½, ¾ Above set also available with ACCESSORIES** (extra)
SS 88 A1		88	100" to 12.000" in steps of .001" 200" to 12.000" in steps of .0001" 300" to 12.000" in steps of .000025" ⅛" to 12.000" in steps of ⅛"	Same as in SS 81. A1 set, plus — 3 blocks .100025, .10005, .100075 4 blocks ⅛, ¼, ½, ¾ Above set also available with ACCESSORIES** (extra)
SS 34 A1		34	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	9 blocks .1001" thru .1009" (steps of .0001") 9 blocks .101" thru .109" (steps of .001") 9 blocks .110" thru .190" (steps of .010") 3 blocks .100" thru .300" (steps of .100") 1 block .500" 1 block 1.000" 2 blocks 2.000" 4.000" also also available with ACCESSORIES*** (extra)
SS 36 A1		36	.200" to 8.000" in steps of .001" .300" to 8.000" in steps of .0001"	Same as in SS 34. A1 set, plus— 1 block .050 1 block .400 also available with ACCESSORIES*** (extra)
SS 28 A1		28	.020" to .240" in steps of .001" .040" to .240" in steps of .0001" .060" to .240" in steps of .00005"	1 block .02005" 9 blocks .0201" thru .0209" (steps of .0001") 9 blocks .021" thru .029" (steps of .001") 9 blocks .010" thru .090" (steps of .010")
SS 8. A1X		8	5.000" to 84" in 1.000 steps	5", 6", 7", 8", 10", 12", 16", 20" plus accessories
SS 8 AAX	GRADE 1	8	5.000" to 84" in 1.000 steps	5", 6", 7", 8", 10", 12", 16", 20" plus accessories

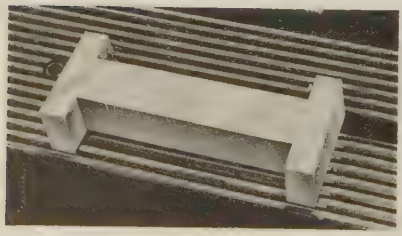
**NOTE: Accessories available for Square Steel sets at extra cost (see page 384) sizes 81 thru 88: 1 pr. half-round jaws .125 radius, 1 pr. half-round jaws .250 radius, 1 pr. straight jaws .500 thick, 1 scriber point, 1 center point, 1 base block, 2 knurled screws, 2 studs, 2 flat head screws (long), 2 flat head screws (short), 2 slotted nuts, 1 each tie rods in following lengths: ¾", 1½", 2¼", 3", 4½" (adj.), 6" (adj.). To order, add "X" to catalog number.

***NOTE: Accessories available for Square Steel sets at extra cost (see page 379), sizes 34 and 36: 1 pr. half-round jaws .250 radius, 1 scriber point, 2 knurled screws, 2 studs, 2 flat head screws (long), 2 flat head screws (short), 2 slotted nuts, 1 each tie rods in following lengths: ¾", 1½", 2¼", 3", 4½" (adj.). To order, add "X" to catalog number.

NOTE: Sets available with etched serial numbers or Certificate of Inspection at extra cost.

Internal Measuring Machine Jaws

Double-Ended, Self-Proving—Assures Parallelism and Squareness



Using No. SA 708 to set an Internal Measuring Machine.

Designed for use with Square Style Gage blocks, No. SA 708 Jaws are made of long-wearing *Croblox* material, 2.000" long, 1.000" wide and .500" thick. Both side edges are lapped 90° square to the gaging faces within 30 seconds of arc and extend beyond the gage blocks in the combination, thus forming a self-truing master.

Jaw and gage combination parallelism is quickly checked merely by turning the combination to the opposite side and rechecking the reading.

Furnished in pairs and available in metric, specify Cat. No. SA 712. Also available in steel English, Cat. No. SA 707 and steel metric, Cat. No. SA 711.

English System
Heavy Duty Style Gage Blocks

17/32" x 1-1/2" Gaging Area

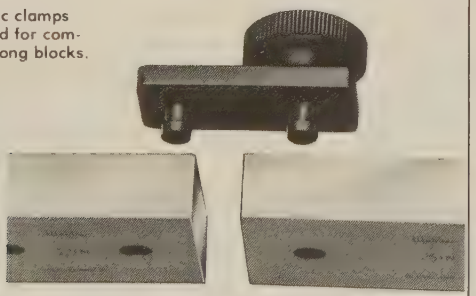
Easy to Assemble into Precision Measuring Tools by Means of Special Fixtures and Accessories

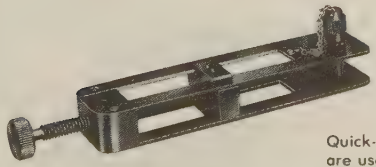
Note that all Heavy Duty blocks 1.000" and over have ¼" holes through the sides, ½" from the ends of gaging surfaces. These holes are designed to fit patented Webber fixtures and permit easy, fast assembly of the blocks into single precision tools, without obstructing the gaging surfaces in any way.

Thus, to build up Webber Heavy Duty Gage Blocks into long "yardsticks" which can be easily moved around for use on the job . . . simply "wring" together the required number of 6, 10 or 20-inch blocks with the smaller blocks necessary to obtain the desired dimension. Then fasten together all blocks over 1.000" in length by dropping Webber Eccentric Clamps into position in the holes . . . and give the knobs a quarter-turn. An eccentric pin clamps the blocks together to form a rigid build-up.

The fractional inch blocks can then be fastened to the larger blocks in the build-up by placing the Webber Quick-Acting Clamp over the end of the last large block, putting the pin in the last hole and tightening the jaws of the clamp with adjusting screw. (Only one Quick-Acting Clamp is required in a set.) All Webber Heavy Duty style blocks 6-inch or over are insulated with a center "grip" to eliminate temperature variations caused by handling the blocks.

Eccentric clamps are used for combining long blocks.





Quick-acting clamps are used for combining fractional inch blocks with blocks one inch or longer.

Accurate "yardsticks" can be built up with Webber Heavy-Duty blocks.

English System

Heavy Duty Style Gage Blocks—Cont.

17/32" x 1-1/2" Gaging Area

Snap Gage used to check inside dimensions of ring gage still mounted in internal grinder.

Snap Gages with inside or outside calipers are easily assembled using eccentric clamps, a quick-acting clamp and a pair of half-round or straight jaws.

Precision Scribers and Dividers for tool layout can be made up in a few seconds. Center point is on a .500" C/L of a 1.000" block. Scriber point is so constructed that it may be sharpened indefinitely without altering the original accuracy.

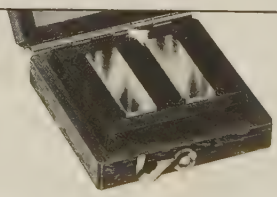
HD-6
Base Block

Height Gages with accuracies in millionths can be quickly assembled using a base block, eccentric clamps, a quick-acting clamp and scriber point block.

Indicator Accessory Set

This new Webber Heavy Duty accessory mounts on any build-up of Heavy Duty blocks and measures the deviation of the work from nominal or desired size. (Indicator is set and checked for zero by placing blocks on any known flat surface.)

Set consists of indicator holding block; Starrett indicator (.0005" graduations ±.010" range or .00005" graduations ±.0015" range); extension jaw 1" thick; case.



Chrome Carbide Wear Blocks in .050" and .100" sizes are available for use with Webber Heavy Duty blocks.

English System

Heavy Duty Style Gage Block Sets in Case

17/32" x 1-1/2" Gaging Area

Catalog No.	Accuracy Grade	Blocks Per Set	Range	Blocks Included in Sets
HD 84. A1	ALL GRADE 2 +.000004" −.000002"	84	.100" to 12.000" in steps of .001" .200" to 12.000" in steps of .0001" .300" to 12.000" in steps of .00005"	2 blocks .100" wear **croblox** 1 block .10005" 9 blocks .1001" thru .1009" (steps of .0001) 49 blocks .101" thru .149" (steps of .001) 19 blocks .050" thru .950" (steps of .050) 4 blocks 1.000" thru 4.000" (steps of 1 inch) 3 Eccentric Clamps Above set also available with 2 additional Eccentric Clamps AND ACCESSORIES* (extra)
HD 46. A1X		46	.200" to 48.000" in steps of .001" .300" to 48.000" in steps of .0001"	9 blocks .1001" thru .1009" (steps of .0001) 9 blocks .101" thru .109" (steps of .001) 9 blocks .110" thru .190" (steps of .010) 9 blocks .100" thru .900" (steps of .100) 4 blocks 1.000" thru 4.000" (steps of 1 inch) 6 blocks 6.000" 10 Eccentric Clamps AND ACCESSORIES* (included)
HD 44. A1X		44	.200" to 36.000" in steps of .001" .300" to 36.000" in steps of .0001"	9 blocks .1001" thru .1009" (steps of .0001) 9 blocks .101" thru .109" (steps of .001) 9 blocks .110" thru .190" (steps of .010) 9 blocks .100" thru .900" (steps of .100) 4 blocks 1.000" thru 4.000" (steps of 1 inch) 4 blocks 6.000" 8 Eccentric Clamps AND ACCESSORIES* (included)
HD 42. A1X		42	.200" to 24.000" in steps of .001" .300" to 24.000" in steps of .0001"	9 blocks .1001" thru .1009" (steps of .0001) 9 blocks .101" thru .109" (steps of .001) 9 blocks .110" thru .190" (steps of .010) 9 blocks .100" thru .900" (steps of .100) 4 blocks 1.000" thru 4.000" (steps of 1 inch) 2 blocks 6.000" 6 Eccentric Clamps AND ACCESSORIES* (included)

NOTE: Case for HD84A1 has space for accessories and 6—6.000" Heavy Duty blocks. To order with accessories, add "X" to catalog number.

***NOTE:** Accessories included in Heavy Duty sets (extra for 84) (see below); 1 quick acting clamp, 1 pr. half-round jaws .500 radius, 1 scriber point, 1 center point, 1 base block.

NOTE: Available with etched serial numbers or Certificate of Inspection at extra cost.

INDIVIDUAL HEAVY-DUTY GAGE BLOCKS

Block Size
.050
.100, .10005"
.1001 thru .1009 in steps .0001"
.101 thru .149 in steps .001"
.150 thru .190 in steps of .010"
.200 thru .950 in steps of .050"
1.000"
2.000"
3.000"
4.000"
6.000"
6.000 H.D. Block with Eccentric Clamp and Case
10.000"
20.000"

NOTE: HEAVY DUTY Blocks available with etched serial numbers or Certificate of Inspection at extra cost.

Separate cases for Gage Block Sets also available

HEAVY-DUTY GAGE BLOCK ACCESSORIES

Catalog No.	Description
	Half-round jaws—
*HDA 1.	.500 radius
HDA 21.	.500 radius **croblox** (optional)
HDA 820.	Straight Jaws (steel) 1.000 thickness, 2¼" long
*HDA 2.	Scriber point
*HDA 3.	Center point (.500 C/L)
HDA 4.	Eccentric clamp
*HDA 5.	Quick acting clamp
*HDA 6.	Base block
HDA 10.	Indicator accessory set consisting of indicator holding block, extension jaw 1" thick, indicator with .0005" graduations ±.010" range, and case
HDA 12.	Indicator accessory set same as above except indicator has .00005" graduations ±.0015" range

INDIVIDUAL WEAR BLOCKS, croblox

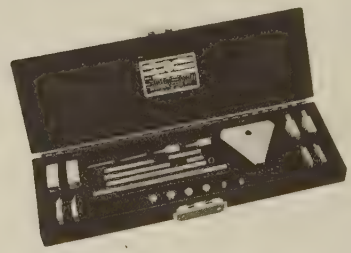
Catalog No.	Size
HDC .050 A1	.050 wear, **croblox**, GRADE 2
HDC .100 WA1	.100 wear, **croblox**, GRADE 2

English System
Gage Block Accessories

Available Individually or in Sets

Rectangular Style

Square Style



No. AC 11. A STANDARD RECTANGULAR GAGE BLOCK ACCESSORY SET*

Description	STEEL Cat. No.	croblox (Optional) Cat. No.
JAWS:		
Half-round jaws—		
1 pair .250 radius	*RA 1.	RA 21.
1 pair .200 radius	RA 2.	RA 22.
1 pair .100 radius	RA 3.	RA 23.
Straight gage block jaws—		
1 pair 2" long, .250" thickness	*RA 4.	RA 24.
CLAMPS:		
1½" capacity	*RA 5.	
4" capacity	*RA 6.	
6½" capacity	*RA 7.	
12" capacity	*RA 8.	
18" capacity	RA 9.	
24" capacity	RA 10.	
Scriber point	*RA 11.	
Center point	*RA 12.	
Base block—1" thickness	*RA 13.	
Case (included with AC 11. A set only)	CS 9111.	

*Items with asterisks (in steel) are included in AC 11. A and 81 thru 92 block sets purchased with accessories.

croblox® ENGLISH WEAR BLOCKS RECTANGULAR

Catalog No.	Size
RC .020 WA1	.020 Wear
RC .050 WA1	.050 Wear
RC .100 WA1	.100 Wear

No. SA 25. A STANDARD SQUARE ACCESSORY SET*

Description	Quan.	STEEL Cat. No.	croblox Cat. No.
Half-round jaws .125 radius	1 Pr.	SA 1.	SA 21.
Half-round jaws .250 radius	1 Pr.	**SA 2.	SA 22.
Straight jaws .500 thick	1 Pr.	SA 3.	SA 23.
Scriber point	1	**SA 4.	—
Center point	1	SA 5.	—
Base block	1	SA 6.	—
Knurled screws	2	**SA 7.	—
Studs	2	**SA 8.	—
Flat head screws (long)	2	**SA 9.	—
Flat head screws (short)	2	**SA 10.	—
Slotted nuts	2	**SA 11.	—
Tie rod—¾" long (solid)	1	**SA 12.	—
Tie rod—1½" long (solid)	1	**SA 13.	—
Tie rod—2¼" long (solid)	1	**SA 14.	—
Tie rod—3" long (solid)	1	**SA 15.	—
Tie rod—4½" long (adj.)	1	**SA 16.	—
Tie rod—6" long (adj.)	1	SA 17.	—
Tie rod—11¾" long (solid)	1	SA 18.	—
Tie rod—15¾" long (solid)	1	SA 19.	—
Tie rod—19¾" long (solid)	1	SA 20.	—
Case (included with SA 25. A set only)	1	CS 9168	—

*All above items (steel) thru SA 17. included in SA 25. A and 81 thru 88 sets ordered with accessories.

**Items with double asterisks included in 34 and 36 block sets with accessories.

Set SS 8. A1X includes 6 studs, 2 ea. screws SA 9. and 10., 1 ea. SA 16. thru 19. and 2 ea. SA 20. Tie Rods.

croblox ENGLISH WEAR BLOCKS SQUARE

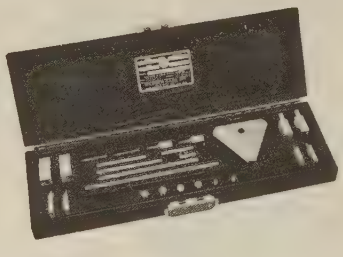
Catalog No.	Size
SC. 100 WA1	.100" with 1 side countersunk

Metric System
Gage Block Accessories

Available Individually or in Sets

Rectangular Style

Square Style



No. AC 11. MA METRIC ACCESSORY SET

Description	STEEL Cat. No.	croblox (Optional) Cat. No.
1 Pair Half-round jaws, 5.00mm radius	RA 101.	RA 201.
1 Pair Straight jaws, 50mm long, 5.00mm thick	RA 104.	RA 204.
Scriber Point	RA 11.	—
Center Point, 2.00mm centerline	RA 112.	—
Base Block, 25mm thick	RA 113.	—
1 Clamp, 37mm Capacity	RA 5.	—
1 Clamp, 100mm Capacity	RA 6.	—
1 Clamp, 160mm Capacity	RA 7.	—
1 Clamp, 300mm Capacity	RA 8.	—
1 Case	CS 9111.	—

croblox® Metric Wear Blocks

Catalog No.	Size
RCM 1.0 WA1	1.0mm
RCM 2.0 WA1	2.0mm

Gage Block Inspection Service

As insurance against production inaccuracies, we offer an inspection service to all gage block users. Prompt service, reasonable cost—see pages 397 and 398 for complete details.

No. SA 25. MA METRIC ACCESSORY SET

Description	STEEL Cat. No.	croblox (Optional) Cat. No.
1 pair 3mm radius jaws	†SA 101.	SA 201.
1 pair 6mm radius jaws	†*SA 102.	SA 202.
1 pair 12mm thick—straight jaws	†SA 103.	SA 203.
1 each Scriber Point	†*SA 4.	—
1 each Center Point—2mm centerline	†SA 105.	—
1 each Base Block—12mm thick	†SA 106.	—
2 each Knurled screws	†*SA 7.	—
2 each studs	†*SA 8.	—
2 each Flat head screws (long)	†*SA 9.	—
2 each Flat head screws (short)	†*SA 10.	—
2 each Slotted nuts	†*SA 11.	—
1 each 19mm Tie rod	†*SA 12.	—
1 each 38mm Tie rod	†*SA 13.	—
1 each 57mm Tie rod	†*SA 14.	—
1 each 76mm Tie rod	†*SA 15.	—
1 each 114mm Tie rod	†*SA 16.	—
1 each 152mm Tie rod	†SA 17.	—
1 each 298mm Tie rod	SA 18.	—
1 each 400mm Tie rod	SA 19.	—
1 each 502mm Tie rod	SA 20.	—
1 each case	†CS 9168.	—

†Items so marked furnished in SA 25. MA accessory set.

*Items so marked furnished in 45 block sets, ordered with accessories.

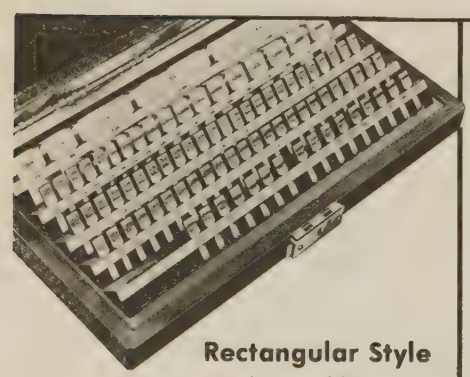
Set No. SS 8. MA1X furnished with 6 studs, 2 short screws, 2 long screws, 1 ea. 114mm, 152mm, 298mm, 400mm tie rods and 2—502mm tie rods.

croblox® Metric Wear Blocks

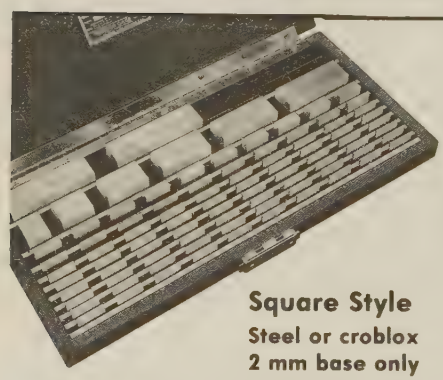
Catalog No.	Size
SCM 2.0 WA1	2.0mm with 1 side countersunk

Metric Gage Blocks

WORLD'S MOST COMPLETE METRIC GAGE BLOCK selection. Designed to offer cost savings in your metric conversion period with a practical and cost-saving new approach.



Rectangular Style
Steel or croblox
1 mm and 2 mm base

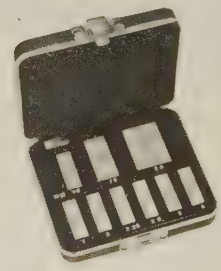


Square Style
Steel or croblox
2 mm base only

NEW!

Mini-Metric Gage Block Set No. RS 9.MA1

For Calibrating and Setting Metric Measuring Tools



This Mini-Metric set of precision gage blocks is used for calibrating micrometers, vernier gages and similar measuring tools. The gage blocks are also useful as setting masters for comparator-type dimensional gages and are recommended for use in teaching the basics of metric measurement.

The set has a capacity of 61 mm in 1 mm, 0.5 mm or 0.25 mm steps. Its nine rectangular hardened steel blocks include these sizes: 1 mm, 2 mm, 2.25 mm, 2.5 mm, 3 mm, 5 mm, 10 mm, 15 mm and 25 mm. They are finished to Federal Accuracy Grade 2 (+0.0001 mm, −0.00005 mm) and come in a lined metal case.

The New 2 mm System A "Makes Cents" Idea

Traditionally, metric gage block sets were produced using a 1 mm base, thus providing .001 mm, .01 mm and .1 mm steps emanating from the 1 mm (prox. .040") dimension. Therefore, 70% of the gages are in the "thin" block category which are more expensive to produce than English measurement sets using a .100" English base size.

Starrett-Webber, in offering 2 mm base sets, provides a more substantial, more efficient set of gage blocks at considerably lower cost. In full compliance with Fed. Spec. GGG-G-15, OIML and ISO standards. Check with your Starrett-Webber distributor. He "makes cents in metric."

Metric System

Rectangular croblox® Gage Block Sets in Case

1 millimeter base

Catalog No.	Acc. Grade	Accuracy in Millimetres	Blocks per Set	Range	Blocks Included in Sets
RC 45. MA1	2	+.0001mm −.00005mm	45	3.0 thru 450 in .001mm steps 2.0 thru 450 in .01mm steps 1.0 thru 450 in .1mm steps	9 blocks 1.001mm thru 1.009mm (steps of .001mm) 9 blocks 1.01mm thru 1.09mm (steps of .01mm) 9 blocks 1.1mm thru 1.9mm (steps of .1mm) 9 blocks 1mm thru 9mm (steps of 1mm) 9 blocks 10mm thru 90mm (steps of 10mm)
RC 45. MAA	1	±.00005mm	45		
RC 45. MLM	0.5	±.00003mm	45		
RC 88. MA1	2	+.0001mm −.00005mm	88	3.0 thru 450 in .0005mm steps 2.0 thru 450 in .001mm steps 1.0 thru 450 in .01mm steps 1.0 thru 450 in .1mm steps	1 block .5mm 1 block 1.0005mm 9 blocks 1.001mm thru 1.009mm (steps of .001mm) 49 blocks 1.01mm thru 1.49mm (steps of .01mm) 18 blocks 1mm thru 9.5mm (steps of .5mm) 10 blocks 10mm thru 100mm (steps of 10mm)
RC 88. MAA	1	±.00005mm	88		
RC 88. MLM	0.5	±.00003mm	88		
RC 112. MA1	2	+.0001mm −.00005mm	112	3.0 thru 250 in .0005mm steps 2.0 thru 250 in .001mm steps 1.0 thru 250 in .01mm steps 1.0 thru 250 in .1mm steps	1 block .5mm 1 block 1.0005mm 9 blocks 1.001mm thru 1.009mm (steps of .001mm) 49 blocks 1.01mm thru 1.49mm (steps of .01mm) 48 blocks 1mm thru 24.5mm (steps of .5mm) 4 blocks 25mm thru 100mm (steps of 25mm)
RC 112. MAA	1	+.00005mm	112		
RC 112. MLM	0.5	±.00003mm	112		

2 millimeter base

Catalog No.	Acc. Grade	Accuracy in Millimetres	Blocks per Set	Range	Blocks Included in Sets
R2C 45. MA1	2	+.0001mm −.00005mm	45	6.0 thru 450 in .001mm steps 4.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	9 blocks 2.001mm thru 2.009mm (steps of .001mm) 9 blocks 2.01mm thru 2.09mm (steps of .01mm) 9 blocks 2.1mm thru 2.9mm (steps of .1mm) 9 blocks 1mm thru 9mm (steps of 1mm) 9 blocks 10mm thru 90mm (steps of 10mm)
R2C 45. MAA	1	±.00005mm	45		
R2C 45. MLM	0.5	±.00003mm	45		
R2C 88. MA1	2	+.0001mm −.00005mm	88	6.0 thru 450 in .0005mm steps 4.0 thru 450 in .001mm steps 2.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	1 block .5mm 1 block 2.0005mm 9 blocks 2.001mm thru 2.009mm (steps of .001mm) 49 blocks 2.01mm thru 2.49mm (steps of .01mm) 18 blocks 1mm thru 9.5mm (steps of .5mm) 10 blocks 10mm thru 100mm (steps of 10mm)
R2C 88. MAA	1	±.00005mm	88		
R2C 88. MLM	0.5	±.00003mm	88		
R2C112. MA1	2	+.0001mm −.00005mm	112	6.0 thru 250 in .0005mm steps 4.0 thru 250 in .001mm steps 2.0 thru 250 in .01mm steps 2.0 thru 250 in .1mm steps	1 block .5mm 1 block 2.0005mm 9 blocks 2.001mm thru 2.009mm (steps of .001mm) 49 blocks 2.01mm thru 2.49mm (steps of .01mm) 48 blocks 1mm thru 24.5mm (steps of .5mm) 4 blocks 25mm thru 100mm (steps of 25mm)
R2C112. MAA	1	+.00005mm	112		
R2C112. MLM	0.5	±.00003mm	112		

Thin Block Set for Measurements Under 2 mm

Catalog No.	Acc. Grade	Accuracy in millimetres	Blocks per set	Range	Blocks Included in Sets
RC 17. MA1	2	+.0001mm −.00005mm	17	From 1.115 thru 3.0mm in .005mm steps	1 block .405mm
RC 17. MAA	1	±.00005mm	17	From .7 thru 3.0mm in .01mm steps	9 blocks .41 thru .49 in .01mm steps
RC 17. MLM	0.5	±.00003mm	17	From .3 thru 3.0mm in .1mm steps	7 blocks .3 thru .9 in .1mm steps

NOTE: No. AC 11.MA Metric Accessory Set in Case also available at extra cost (see page 379).

NOTE: Sets available with etched serial numbers or Certificate of Inspection at extra cost. Grade 0.5 sets must be purchased with etched serial numbers and Certificate of Inspection at extra cost.

Metric cloblox wear blocks available as option (see page 379).

Metric System

Rectangular Steel Gage Block Sets in Case

1 millimeter base

Catalog No.	Accuracy in Millimetres	Blocks per Set	Range	Blocks Included in Sets
RS 9 MA1 MINI METRIC	ALL GRADE 2	9	1.0 thru 61.0mm in 1.0mm steps 2.0 thru 61.0mm in .5mm steps 4.0 thru 61.0mm in .25mm steps	3 blocks 1.0mm 2.0mm 2.25mm 4 blocks 2.5mm 3.0mm 5.00mm 10.0mm 2 blocks 15.0mm 25.0mm
RS 17. MA1	+.0001mm −.00005mm	17	1.115mm thru 3.0 in .005mm steps .7mm thru 3.0mm in .01mm steps .3mm thru 3.0mm in .1mm steps	1 block .405mm 9 blocks .41mm thru .49 in .01mm steps 7 blocks .3 thru .9 in .1 mm steps
RS 45. MA1		45	3.0 thru 450 in .001mm steps 2.0 thru 450 in .01mm steps 1.0 thru 450 in .1mm steps	9 blocks 1.001mm thru 1.009mm (steps of .001mm) 9 blocks 1.0mm thru 1.09mm (steps of .01mm) 9 blocks 1.1mm thru 1.9mm (steps of .1mm) 9 blocks 1mm thru 9mm (steps of 1mm) 9 blocks 10mm thru 90mm (steps of 10mm)
RS 88. MA1		88	3.0 thru 450 in .0005mm steps 2.0 thru 450 in .001mm steps 1.0 thru 450 in .01mm steps 1.0 thru 450 in .1mm steps	1 block .5mm 1 block 1.0005mm 9 blocks 1.001mm thru 1.009mm (steps of .001mm) 49 blocks 1.01mm thru 1.49mm (steps of .01mm) 18 blocks 1mm thru 9.5mm (steps of .5mm) 10 blocks 10mm thru 100mm (steps of 10mm)
RS 112. MA1		112	3.0 thru 250 in .0005mm steps 2.0 thru 250 in .001mm steps 1.0 thru 250 in .01mm steps 1.0 thru 250 in .1mm steps	1 block .5mm 1 block 1.0005mm 9 blocks 1.001mm thru 1.009mm (steps of .001mm) 49 blocks 1.01mm thru 1.49mm (steps of .01mm) 48 blocks 1mm thru 24.5mm (steps of .5mm) 4 blocks 25mm thru 100mm (steps of 25mm)

2 millimeter base

Catalog No.	Accuracy in Millimetres	Blocks per Set	Range	Blocks Included in Sets
R2S 45. MA1	ALL GRADE 2	45	6.0 thru 450 in .001mm steps 4.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	9 blocks 2.001mm thru 2.009mm (steps of .001mm) 9 blocks 2.01mm thru 2.09mm (steps of .01mm) 9 blocks 2.1mm thru 2.9mm (steps of .1mm) 9 blocks 1mm thru 9mm (steps of 1mm) 9 blocks 10mm thru 90mm (steps of 10mm)
R2S 88. MA1	+.0001mm −.00005mm	88	6.0 thru 450 in .0005mm steps 4.0 thru 450 in .001mm steps 2.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	1 block .5mm 1 block 2.0005mm 9 blocks 2.001mm thru 2.009mm (steps of .001mm) 49 blocks 2.01mm thru 2.49mm (steps of .01mm) 18 blocks 1mm thru 9.5mm (steps of .5mm) 10 blocks 10mm thru 100mm (steps of 10mm)
R2S 112. MA1		112	6.0 thru 250 in .0005mm steps 4.0 thru 250 in .001mm steps 2.0 thru 250 in .01mm steps 2.0 thru 250 in .1mm steps	1 block .5mm 1 block 2.0005mm 9 blocks 2.001mm thru 2.009mm (steps of .001mm) 49 blocks 2.01mm thru 2.49mm (steps of .01mm) 48 blocks 1mm thru 24.5mm (steps of .5mm) 4 blocks 25mm thru 100mm (steps of 25mm)

NOTE: No. AC 11. MA Metric Accessory Set in Case also available at extra cost (see page 379).

NOTE: All sets available with etched serial numbers or Certificate of Inspection at extra cost.

Federal Accuracy Grade 0.5 (Formerly AAA) (±.00003mm)
1 (Formerly AA) (±.00005mm)
2 (Formerly A+) (+.0001mm −.00005mm)
3 (Formerly A&B) (+.00015mm −.00005mm)

Metric croblox wear blocks available as option. (See Page 379)

Metric System

Square croblox® and Steel Gage Block Sets in Case

2 millimeter base

Catalog No.	Acc. Grade	Accuracy in Millimeters	Blocks per Set	Range	Blocks Included in Sets
S2C 45. MA1	2	+.0001mm −.00005mm	45	6.0 thru 450 in .001mm steps 4.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	9–2.001 thru 2.009 in .001mm steps 9–2.01 thru 2.09 in .01mm steps 9–2.1 thru 2.9 in .1mm steps 9–1.0 thru 9.0 in 1.0mm steps 9–10 thru 90 in 10mm steps
S2C 45. MA1X	2	+.0001mm −.00005mm	45	6.0 thru 450 in .001mm steps 4.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	Same as above plus the following Accessories: 1 pair SA 102. 6mm radius jaws 1 each SA 4. Scriber point 2 each SA 7. Knurled screws 2 each SA 8. Studs 2 each SA 9. Flat head screws (long) 2 each SA 10. Flat head screws (short) 2 each SA 11. Slotted nuts 1 each SA 12. 19mm Tie rod 1 each SA 13. 38mm Tie rod 1 each SA 14. 57mm Tie rod 1 each SA 15. 76mm Tie rod 1 each SA 16. 114mm Tie rod
S2C 88. MA1	2	+.0001mm −.00005mm	88	6.0 thru 450 in .0005mm steps 4.0 thru 450 in .001mm steps 2.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	1–.5mm 1–2.0005mm 9–2.001 thru 2.009 in .001mm steps 49–2.01 thru 2.49 in .01mm steps 18–1.0 thru 9.5 in .5mm steps 10–10 thru 100 in 10mm steps
S2C 112. MA1	2	+.0001mm −.00005mm	112	6.0 thru 250 in .0005mm steps 4.0 thru 250 in .001mm steps 2.0 thru 250 in .01mm steps 2.0 thru 250 in .1mm steps	1–.5mm 1–2.0005mm 9–2.001 thru 2.009 in .001mm steps 49–2.01 thru 2.49 in .01mm steps 48–1.0 thru 24.5 in .5mm steps 4–25 thru 100 in 25mm steps

NOTE: The above croblox sets have gages below 1.5mm and over 10mm in steel. Certificate of Inspection and Etched Serial Numbers optional at extra cost.

NOTE: Metric croblox wear blocks available as option. See Page 379

NOTE: Square internal measuring machine jaws also available in metric, Cat. No. SA 712, see page 374.

No. SA 25. MA SQUARE STYLE METRIC ACCESSARY SET IN CASE FOR 88 and 112 SETS

1 pair SA 101. 3mm radius jaws	1 each SA 106. Base Block—12mm thick	1 each SA 12. 19mm Tie rod
1 pair SA 102. 6mm radius jaws	2 each SA 7. Knurled screws	1 each SA 13. 38mm Tie rod
1 pair SA 103. 12mm thick—straight jaws	2 each SA 8. studs	1 each SA 14. 57mm Tie rod
1 each SA 4. Scriber Point	2 each SA 9. Flat Head Screws (long)	1 each SA 15. 76mm Tie rod
1 each SA 105. Center Point—2mm centerline	2 each SA 10. Flat head screws (short)	1 each SA 16. 114mm Tie rod
	2 each SA 11. Slotted nuts	1 each SA 17. 152mm Tie rod
		1 each CS 9168. case

SA 101., SA 102., SA 103. jaws available in croblox.

Metric System
Square Steel Gage Block Sets in Case

2 millimeter base

Catalog No.	Acc. Grade	Accuracy in Millimeters	Blocks per Set	Range	Blocks Included in Sets
S2S 45 MA1	2	+ .0001mm — .00005mm	45	6.0 thru 450 in .001mm steps 4.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	9–2.001 thru 2.009 in .001mm steps 9–2.01 thru 2.09 in .01mm steps 9–2.1 thru 2.9 in .1mm steps 9–1.0 thru 9.0 in 1.0mm steps 9–10 thru 90 in 10mm steps
S2S 45. MA1X	2	+ .0001mm —.00005mm	45	6.0 thru 450 in .001mm steps 4.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	Same as above plus the following Accessories. 1 pair SA 102. 6mm radius jaws 1 each SA 4. Scriber point 2 each SA 7. Knurled screws 2 each SA 8. Studs 2 each SA 9. Flat head screws (long) 2 each SA 10. Flat head screws (short) 2 each SA 11. Slotted nuts 1 each SA 12. 19mm Tie rod 1 each SA 13. 38mm Tie rod 1 each SA 14. 57mm Tie rod 1 each SA 15. 76mm Tie rod 1 each SA 16. 114mm Tie rod
S2S 88 MA1	2	+.0001mm — .00005mm	88	6.0 thru 450 in .0005mm steps 4.0 thru 450 in .001mm steps 2.0 thru 450 in .01mm steps 2.0 thru 450 in .1mm steps	1–.5mm 1–2.0005mm 9–2.001 thru 2.009 in .001mm steps 49–2.01 thru 2.49 in .01mm steps 18–1.0 thru 9.5 in .5mm steps 10–10 thru 100 in 10mm steps
S2S 112. MA1	2	+.0001mm —.00005mm	112	6.0 thru 250 in .0005mm steps 4.0 thru 250 in .001mm steps 2.0 thru 250 in .01mm steps 2.0 thru 250 in .1mm steps	1–.5mm 1–2.0005mm 9–2.001 thru 2.009 in .001mm steps 49–2.01 thru 2.49 in .01mm steps 48–1.0 thru 24.5 in .5mm steps 4–25.0 thru 100.0 in 25mm steps
SS 8. MA1X	2	+.0001mm —.00005mm	8	125mm to 2100mm	125mm 250mm 150mm 300mm 175mm 400mm 200mm 500mm Accessories included: 6 studs, 2 short screws, 2 long screws, 1 ea. 114mm, 152mm, 298mm, 400mm tie rod and 2-502mm tie rod.
SS 8 MAAX	1	± 00005mm	8	125mm to 2100mm	Same as above

NOTE: Croblox wear blocks available as option. See Page 379

Thin Block Set for Measurements Under 2 mm

Catalog No.	Acc. Grade	Accuracy in Millimeters	Blocks per Set	Range	Blocks Included in Set
SS 17. MA1	2	+.0001mm —.00005mm	17	From: 1.115 thru 3.0mm in .005mm steps From: .7 thru 3.0mm in .01mm steps From: .3 thru 3.0mm in .1mm steps	1–.405mm 9–.41 thru .49 in .01mm steps 7–.3 thru .9 in .1mm steps

See Page 379 for Square Metric Accessories.
Certificate of Inspection and Etched Serial Numbers optional at extra cost.

Angle Gage Blocks

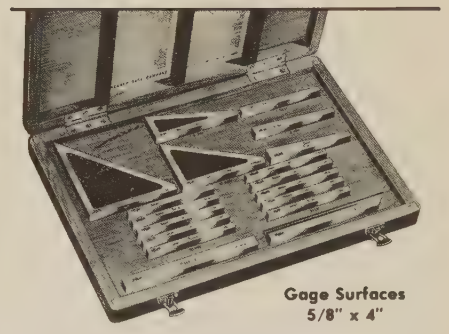
Tool Room

(1-second accuracy)

Angle Gage Blocks

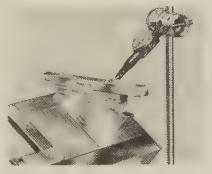
are designed for shop and tool room use . . . on work in the machine, or in final inspection. They reduce set-up time and minimize error in grinding both simple and compound angles.

Webber 1-second Angle Gage Blocks are made of extra-hard, heat treated, artificially stabilized steel. They are available in three standard set sizes: 18 blocks, 0°-99° in 1-second steps; 13 blocks, 0°-99° in 1-minute steps; 8 blocks, 0°-99° in 1-degree steps.



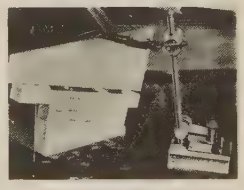
Gage Surfaces
5/8" x 4"

Setting a Revolving Magnetic Chuck



This photograph shows a chuck being set for a 38° angle. Three blocks, +30°, +5° and +3°, are assembled and mounted with the parallel. The indicator quickly tells if the setting is accurate. Adjustment is a matter of seconds. A revolving chuck teams up perfectly with angle blocks to make possible several applications in tool grinding heretofore found difficult with other methods.

Inspecting a Simple Angle



The photograph shows a workpiece on which an angle of 13° is desired. The workpiece is resting on a parallel which is wrung to angle blocks forming 13°. The entire setup is lined up vertically with an angle plate and then indicated across the top of the work to determine the correctness of the angle.

Laboratory Master

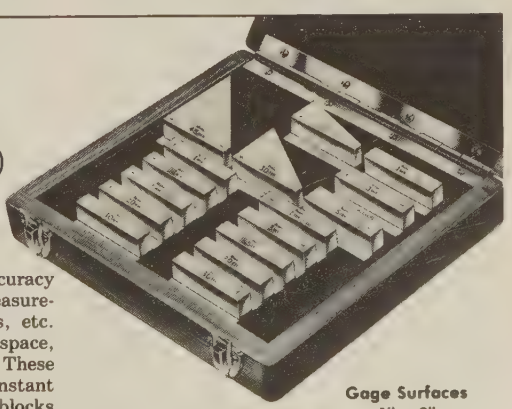
(¼-second accuracy)

(croblox) and Inspection Grade (Steel)

(½-second accuracy)

Angle Gage Blocks

are designed for optical or highest-accuracy laboratory use, and as standards of measurement for autocollimators, spectrometers, etc. They are unsurpassed for use in the aerospace, optical and precision instrument fields. These blocks are checked for accuracy in a constant temperature of 68°F against master blocks which have been calibrated by optical means to an accuracy of .1 second.



Gage Surfaces
1" x 2"

Angle Gage Block Sets

Catalog No.	Accuracy Grade	Blocks Per Set	Range	Blocks Included in Sets
AG 18. TR	"Tool Room" (1-second)	18*	0° to 99° in steps of one second	6 blocks, 1, 3, 5, 15, 30, 45 degrees 5 blocks, 1, 3, 5, 20 30 minutes 5 blocks, 1, 3, 5, 20, 30 seconds *6" parallel and 6" Knife edge also included with "Tool Room" accuracy sets.
AG 16. S1 AG 16. LM	"Inspection" (½-second) "Laboratory Master" (¼-second)	16		
AG 13. TR	"Tool Room" (1-second)	13*	0° to 99° in steps of one minute	6 blocks, 1, 3, 5, 15, 30, 45 degrees 5 blocks, 1, 3, 5, 20, 30 minutes *6" parallel and 6" Knife edge also included with "Tool Room" accuracy sets.
AG 11. S1 AG 11. LM	"Inspection" (½-second) "Laboratory Master" (¼-second)	11		
AG 8. TR	"Tool Room" (1-second)	8*	0° to 99° in steps of one degree	6 blocks, 1, 3, 5, 15, 30, 45 degrees *6" parallel and 6" Knife edge also included with "Tool Room" accuracy sets.
AG 6. S1 AG 6. LM	"Inspection" (½-second) "Laboratory Master" (¼-second)	6		

***NOTE:** One 6" parallel and one 6" Knife edge also included with "Tool Room" Accuracy sets only. Also available separately.

NOTE: All sets furnished in case. Cases also available separately.

Specifications

Webber Angle Gage Blocks furnish fast, very simple and extremely accurate measurements of any angle. They're far superior to sine bar measuring methods, which involve trigonometric formulae and complicated stacks of gage blocks.

A set of Webber Angle Gage Blocks consisting of only 16 blocks will measure 356,400 angles in steps of one second, to an accuracy of 1/5,000,000th of a circle! The reason is because these micro-accurate blocks are so designed that they can be used in either plus or minus positions.

For instance, to obtain a measurement of 35° you simply take the 30° angle and add the 5° angle, making sure that both plus ends are together. To get a measurement of 25°, you use the same two blocks but wring them together so that the minus end of the 5° block is over the plus end of the 30° block. This will subtract 5° from 30°, thus giving your 25° measurement. Any size angle can be quickly and easily obtained in this manner, using only a few blocks in the proper combination of plus and minus positions. See illustration next page.

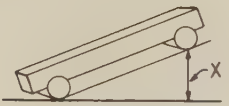
Angle Gage Blocks	Accuracy		
	Tool Room	Inspection	Lab or Ref. Grade
Material	Steel	Steel	**croblox**
Area of Base Gaging Surface	⅜ x 4"	1" x 2"	1" x 2"
Deviation from Nominal Angle	±1 sec.	±½ sec.	±¼ sec.
Flatness Across Width	.000004*	.000002*	.000001*
Flatness Along Length	.000006**	.000002***	.000001***
Flatness of Sides	.000010*	.000004*	.000004*
Surface Finish (Gaging Surfaces only)	.6 to .8 micro-inch AA	.5 micro-inch AA	.1 to .3 micro-inch AA
Squareness of Gaging Surfaces to Sides	±2 sec.	±2 sec.	±1 sec.
Accuracy of Calibration	1 sec.	½ sec.	¼ sec.

Special Angle Blocks Quoted on Request

*Excludes 1/16 from Edges **Excludes 1/4 from Ends
***Excludes 1/16 from Ends

Angle Gage Blocks

Angle Measurements Superior to Sine Bar Methods



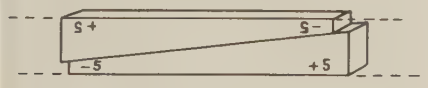
A precision angle has always been difficult to set because of the involved trigonometric formula that is used with the sine bar.

The chief difficulty lies in the dimension X in diagram above which often results in a figure with many decimal places. Gage blocks can only approximate this value. For example, to measure 44°30' using a 5" sine bar the following steps are required:

Sine for 44°30' angle	.7009093
For dimension X multiply by 5	3.5045465
Gage blocks necessary to match this dimension	.1005 .104 .300 3.000
	3.5045
3.5045465 — 3.5045 = Residual error	.0000465

This error cannot be eliminated in sine bar procedure.

With angle gage blocks you merely take a 45° block from the set, wring on a 30' block so that the plus end of 45° block contacts the minus end of 30' block and you have an angle of 44°30'. How much simpler! And what's more important, it is absolutely accurate.



Proof is in the block themselves. The diagram shows two 5° block wrung together with the plus and minus ends adjacent, resulting in two parallel lines.

Showing use of autocollimator in checking flatness or parallelism.

Angle Gage Blocks Used with Autocollimator in Indexing Large Rotary Table

A Webber Angle Block or TRUE Square is positioned on the work and a beam of light from an autocollimator is directed against the gaging surface. This becomes 0° or the reference surface. Other angle blocks are then added in proper combination to measure each succeeding angle. The table is rotated and inspected at each position with reference to the light beam. This method indexes large workpieces quickly with accuracy measured in fractional seconds of arc.

Inspecting Simple and Compound Angles

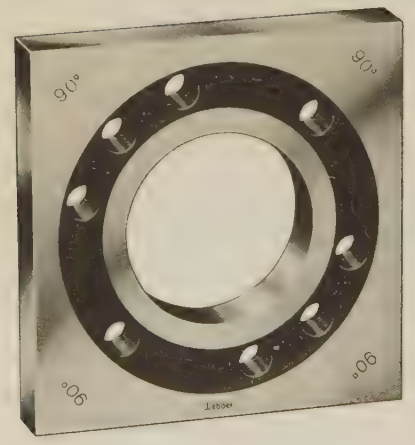
Webber Angle Gage Blocks can be used with the work in the machine or in final inspection. The blocks reduce set-up time and minimize error in grinding simple and compound angles. A workpiece on which an angle of 13 degrees is desired is placed on a parallel which is wrung to the angle blocks to form 13 degrees. The entire setup is lined up vertically with an angle plate, then indicated across the top of the work to determine the correctness of the angle.

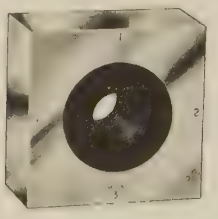
Or take a workpiece with a compound angle—the first angle of 14 degrees 30'—second angle of 8 degrees running at right angles to the first. To check the 14 degrees 30' angle, the work is laid on a parallel which is wrung to the proper combination of three blocks forming an angle of 14 degrees 30'. Correctness of this angle is then easily determined by indicating across the top surface of the work.

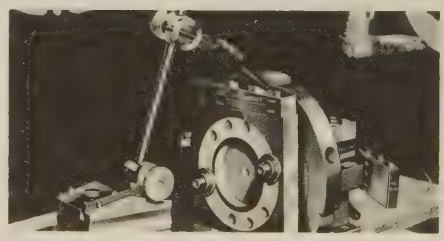
Assuming that this has been found correct the inspection is continued by wringing together the proper blocks to form 8 degrees. These are laid on the 8 degree surface of the workpiece. After squaring them and setting them at right angles to the first surface, the correctness of the 8 degree angle can then be readily determined by indicating along the length of the gage blocks. The work can be placed on the surface plate or on top of the blocks, whichever is more convenient.

True Squares

For Fast Precision Indexing With Angle Gage Blocks







All faces of Webber True Squares are at precisely 90° to adjacent sides, with perfect optical flatness and parallelism . . . to permit use with various makes of autocollimators.

Applications of the True Square for fast precision indexing and setting of angular grinding fixtures are almost unlimited. The photograph shows how four notches are ground at 90° invatervals with the aid of the Webber True Square. The work and the true square are mounted together on a revolving fixture. The notch is ground by two successive cuts; one at 90° with the true square, and the other at 2° with the addition of two angle blocks (+3° and −1°) mounted on square. An indicator reading is taken before each grind. This process is repeated by turning the True Square to successive zero readings.

In this job the Webber True Square makes it possible to grind each notch with the single setting plus a small adjustment for the 2° cut . . . thus saving the time otherwise required to make 8 settings.

Webber True Squares are available in three accuracies: 1/4-second accuracy, made in diamond-hard chrome carbide, size 2" x 2" x 1"; 1/2-second "Inspection" accuracy in steel, size 2" x 2" x 1"; and 1-second "Tool Room" accuracy, in steel, 4" x 4" x 5/8".

Cat No	TS 44. TR†	TS 21. S1†	TS 21. LM †
Material	Steel	Steel	**croblox**
Gaging Surface Area	5/8" x 4"	1" x 2"	1" x 2"
Deviation from Nominal Angle	±1 Sec	±1/2 Sec.	±1/4 Sec
Flatness across width	.000004"*	.000002"*	.000001"*
Flatness along length	.000006"**	.000002"***	.000001"***
Flatness of sides	.000010"*	.000004"*	.000004"*
Surface finish (Gaging Surfaces)	.6 to .8 microinch AA	.5 microinch AA	.1 to .3 microinch AA
Squareness of Gage Surface to Sides	±2 Sec	±2 Sec.	±1 Sec.
Accuracy of Calibration	1 Sec	1/2 Sec.	1/4 Sec.

*Excludes 1/16 From Edges
**Excludes 1/4 From Ends
***Excludes 1/16 From Ends
†Case included

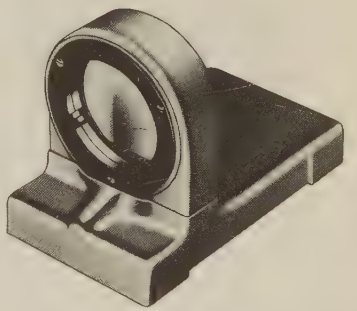
Right Angle Target

For Setting Autocollimators to Read Exactly 90° From a Plane Surface

This Webber accessory is ideal for checking surface plates, machine tool ways, toolmaker's squares, or other high-precision right angles or flat surfaces. When an autocollimator is set to the Webber Right Angle Target, the deviation from 90° of any object may be viewed and calibrated. The 5-inch base length gives 1 second of an arc deflection for each .000025" of height variation.

Due to its unique construction, the 90° Target may be quickly checked for accuracy by revolving it 180° and viewing the opposite side. This reading will be twice the actual inherent error in the Right Angle Target.

Accuracy of this 90° Target is guaranteed to be within ¼ second.



Catalog Number	Accuracy	Height Base to Center Length	Base Length	Target Diameter
RAT 1. L	¼ second	4¼"	5"	1⅞"
RAT 1. W	¼ second	2⁹⁄₁₆"	5"	1⅞"

NOTE: Furnished with case.

Round Chrome Carbide Optical Flat Reflecting Targets

Also for Use as Comparator Measuring Anvils

Made of chrome carbide, these targets are very hard, resistant to wear and corrosion, and take a high surface finish. They permit extremely accurate measurements when used with autocollimators or optical angle measuring comparators . . . as images reflected from their highly polished surfaces are extremely sharp. Webber Reflecting Targets are double sided and are easily adaptable to special fixturing.

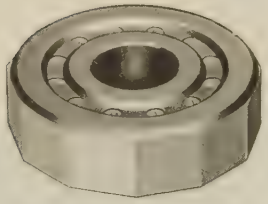
Catalog Number	Size		Accuracy Flatness—Parallelism
	Diameter	Thickness	
RTC 1.	1¼"	¼"	.000002"
RTC 2.	2"	½"	.000002"
RTC 3.	3"	⅝"	.000002"

Standard croblox® Reflecting Cubes

Stable—Maintenance Free

Webber Gage Division stocks semi-finished solid cube blanks for fast delivery of 90° reference surfaces in four standard sizes: 3/4", 1", 1-1/2", 2". Ideal for 90° indexing or alignment in optical tooling or inspection. Reflectivity: 90 to 94% at 10.6 microns. Also available as standard—.950" square with 17/64" counterbored center hole. Other size cubes with center holes available to special order. Information required for ordering: (1) number of finished faces desired; (2) 90° accuracy of finished faces to one of these tolerances: 1/4 second, 1/2 second, 1 second, 2 seconds, or 3 seconds; (3) flatness of finished faces.

Optical Polygons
Solid croblox (Chrome Carbide)



Number of Sides	Diameter Across Corners	Height	Angle Spacing Degrees	Target Size	Target Area Sq In
3	2 46	688	120	9/16 x 640	357
4	2 46	688	90	9/16 x 640	357
5	2 46	688	72	9/16 x 640	357
6	2 46	688	60	9/16 x 640	357
8	2 46	688	45	9/16 x 640	357
9	2 46	688	40	9/16 x 640	357
10	2 46	688	36	9/16 x 640	357
12	2 46	688	30	9/16 x 640	357
16	3 052	625	22 30	17/32 x 17/32	281
18	3 052	625	20	17/32 x 17/32	281
24	4 060	625	15	17/32 x 17/32	281
36	6 092	625	10	17/32 x 17/32	281
72	8 60	625	5	3/8 x 17/32	200

ALL SIZES:
Flatness and Parallelism—Top and Bottom—.00005"
Maximum Pyramidal Error . . . ±15 seconds.
Furnished in Case.

Webber Optical Polygons furnish an easy, accurate method of checking and calibrating angles. They are designed for use with autocollimators in measuring angle spacing.

The exclusive one-piece design provides compact, fixed masters for angle spacing of from 5° to 120°. Reflecting target faces are highly reflective and optically flat.

Chrome Carbide polygons provide a hardness of Rockwell 71-73 "C" and a corrosion resistance 20 times that of 18-8 stainless steel resulting in lifetime accuracy formerly unknown.

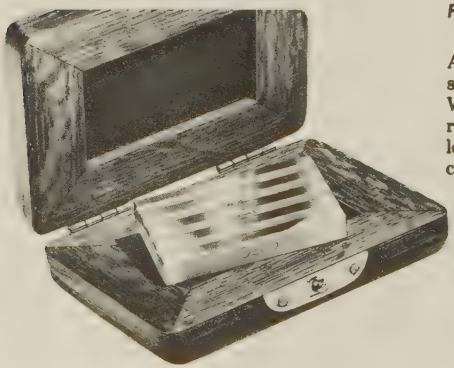
Maintenance problems are practically eliminated due to their ruggedness and extreme stability.

A one-inch mounting hole, flanged bushing, lapped washer and hold down bolt permit mounting the polygon in any desired attitude.

Available in 2 Grades

Grade	Target Area Flatness	Determination of Accuracy	Maximum Deviation of Faces from Nominal		
			0-18	19-36	36-72
Reference 0	.000001"	25 Sec	1 0 Sec	2 5 Sec.	5 0 Sec.
Calibration 1	.000002"	0 5 Sec.	2.5 Sec.	5 0 Sec.	5.0 Sec.

Special applications or custom polygons quoted on request.



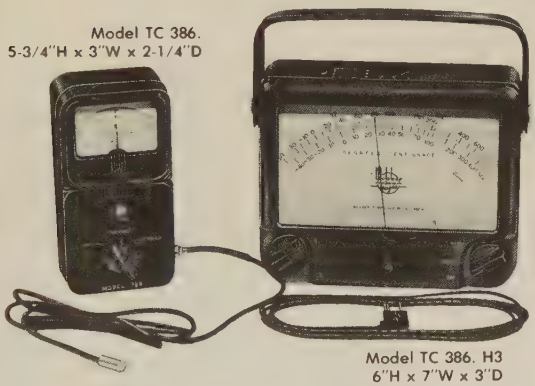
Differential Measuring Table

For Dimensions Under .100"

A means of measuring thin dimensions without subjecting gage blocks to undue wear, the Webber Differential Measuring Table is accurate to ±.000005". It is .300" thick by 1-15/16" long by 1-1/8" wide. Available in steel or croblox (chrome carbide).

Catalog No. DM 1. TS (Steel)
Catalog No. DM 1. TC (Croblox)

Temp-Chek® Temperature Meters



Model TC 386.
5-3/4"H x 3"W x 2-1/4"D

Model TC 386. H3
6"H x 7"W x 3"D

Temp-Chek speeds up gage block measurements by eliminating long waits for gage blocks and work to reach the same temperature. Simply place the Temp-Chek probe on the piece to be inspected . . . you can read the exact temperature on the dial. A quick calculation from the Temp-Chek reading then gives exact dimensions.

Easy application for sensitive thermistor or thermocouples, from one to three (depending on model) to the work and/or the master.

Webber Temp-Chek meters can be used for either spot checking or continuous temperature indications.

Catalog No	Temperature Range	Degree Divisions	Accuracy	Probe	Power Source
TC 386.	60° to 100°F	1	2% full scale reading	One L-3	One Type C Battery
TC 386.H3	- 50° to + 1000°F (-40° to + 500°C) Shows temperatures at three different locations by means of rotating switch.	2° to 25°F. 1° to 25°C. (Depending on Range Point)	±1-1/2 scale divisions	Three (one included, L-1 or L-2)	One Type D Battery

NOTE: Leather "ever-ready" cases available for all models.

NOTE: Probes: L-1 general purpose iron constantan, twisted wire ends; 7½ foot insulated length (for TC 386. H3 only).

L-2 surface temperature probe, 7½ foot length (for TC 386. H3 only).

L-3 thermistor type, 4 foot length (for model TC 386. only).

Gage Block Stones

If, after gage blocks have been used, it is found that a block does not wring together with other blocks, this is no fault of the gage. It is the result of nicks or other damage areas caused by careless handling against other pieces of hardened steel. Examine blocks carefully with a magnifying glass. If a small burr is found (usually at the edge of the block), it should be removed with a Gage Block Stone.

Webber Stones, when used moderately, may be rubbed directly on the gaging surfaces without danger of decreasing the size of the gage block.

Cat. No. NA 13. Natural Arkansas Stone, 1/4" x 1" x 3" (for steel blocks)

Cat. No. SAO 13. Sintered Aluminum Oxide, 5/16" x 1" x 3" (for steel or carbide)

Cat. No. SAO 23. Serrated Aluminum Oxide with Case, 1" x 2" x 3" (for steel or carbide)

Chamois

For Wiping Gage Surfaces

This Webber Synthetic Chamois is recommended over natural chamois because it can be used with solvents and oils (including Starrett M-1) and is washable in detergents.

Cat. No. CH 1. (Dry)
Cat. No. CH 2. (Lubricated)

Thermal Comparator

The Starrett-Webber thermal comparator is a slide rule which gives the relative difference in thermal expansion or contraction between **croblox** (chrome carbide) and steel. One side for English measurement, the other side for metric. Temperature range is 60° to 100°F (15° to 40°C) for up to 4.000" or 100 mm in length.

Cat. No. COMP 1.

Fused Quartz Optical Flats

Check Flatness of Seals—Gages—Mating Surfaces

Starrett-Webber Fused Quartz Optical Flats provide a simple, accurate method for precision measurement of surface flatness. Available in accuracies of .000001", .000002" or .000004"; single or double surfaced; coated or uncoated.

STANDARD SIZES		
1" x ½"	4" x ¾"	8" x 1 9/16"
2" x ⅝"	5" x ⅞"	10" x 1 11/16"
3" x 11/16"	6" x 1"	12" x 2"

All furnished with case. Center holes available.
Special sizes quoted on request.
Certificate of Inspection available at extra cost.

Facts to Aid you in Your Selection of the Right Flat for the Job . . .

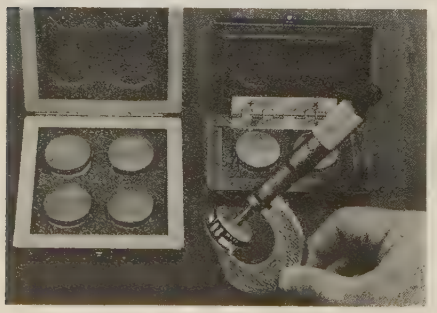
1. Single surfaced means one side finished to tolerance. Double Surfaced means both sides to tolerance. A side band arrow indicates finished surfaces.
2. Coating purpose is to sharpen the fringe pattern but is of value on single surfaced flats only.

Resurfacing—Inspection

Webber Gage Division is equipped to resurface any make quartz optical flats and welcomes the opportunity to examine your worn flats, furnish a Certificate of Inspection and/or refinish them to the tolerance you require.

Optical Parallel Sets

Designed for the checking of micrometer anvil and spindle faces for flatness and squareness to the spindle axis. The condition of the faces is revealed by viewing the fringe pattern. The individual optical parallels are furnished in progressive thicknesses to enable a check of the spindle face in either ½ or ¼ revolution positions.



Catalog No. OFP 2.

Consists of two parallels with one .0125" thicker than the other enabling a measuring face check at half revolution points of the micrometer spindle.

Each Parallel Identified. Furnished in case. (Also available in SAPPHIRE)

Catalog No. OFP 4.

Consists of four parallels with each succeeding parallel .00625" larger than the other for checking quarter revolutions of the micrometer spindle face positions. Each parallel identified. Furnished in case.

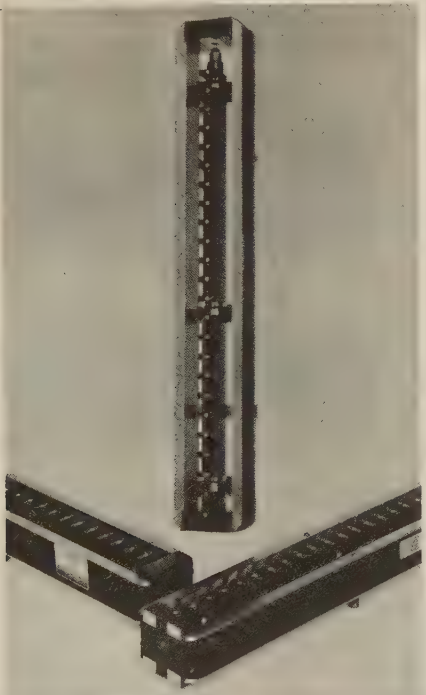
Specifications

1" Dia. x ½"
Double Surfaced
Flatness within .000004"
Parallelism within .000004"
To Nominal Thickness: ±.002"

Standard Reference Bars

New Design Master Bar For One Inch Increments

Channel Design
in 12"-19"-25"-37"-49" Sizes*



NOTE: Non-standard lengths and measuring increments available on special order.

*Metric models in 300, 500, 650, 950 and 1250 mm sizes.

Specifications

Linear Accuracy: +.000004, −0.00000 per inch of length (Eng.) +0.0001 mm, −0.0000 per 25 mm of length (Metric)

Parallelism: Gage Surfaces to base and each other .000015" (.0004 mm)

Certificate of Inspection furnished with all bars. All models furnished with storage case.

Either Vertical or Horizontal Measurements to Accuracies of +.000004", −.000000 per Inch of Length, +0.0001 mm, −0.0000 per 25 mm of Length

Webber Standard Reference Bars are invaluable for use in checking table movement of machine tools . . . for checking the accuracy of vernier height gages . . . for surface plate transfer measurement . . . for final inspection of precision machine tools, manual or tape controlled . . . for countless precision indexing jobs.

The new improved "channel design" places additional supports at the appropriate points, for the length of the bar, providing firm protection against minor shocks. The alternating .300" gage block jaws and .700" spacer blocks are permanently wrung and fastened together to form the one-inch increments. A special bushing arrangement allows the master stack to conform to thermal conditions prevailing during use, thus providing a true master even under less than perfect laboratory conditions. Mating surfaces are especially treated during assembly to prevent corrosion.

Channel design permits use of the bar on 'its' base (vertical) or on 'its' back or either side (horizontal).

Free Stack Design

Webber Standard Reference Bars are also available without the channel frame. Primarily designed for vertical measurement.

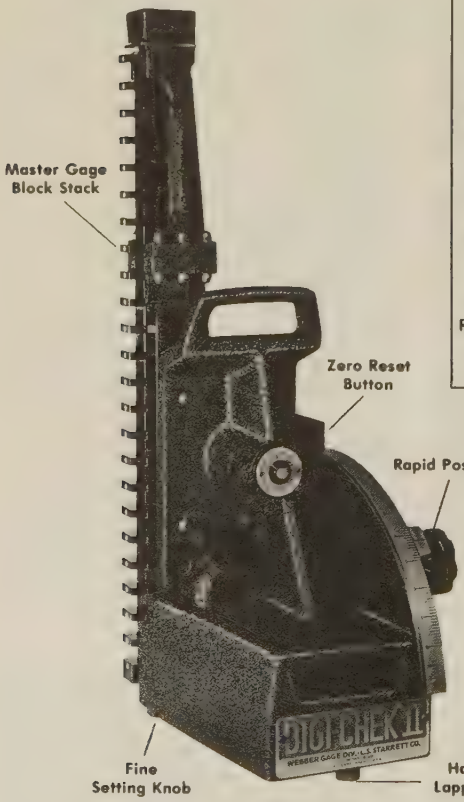
Standard Free Stack Models are available in 8, 10, 12 and 18 inch heights. Also 200, 250, 300, and 450 mm.

Digi-Chek®II

the NEW look in the world's fastest, most precise height master.

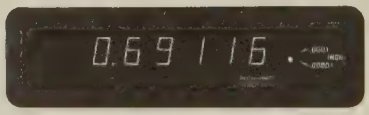
English and Metric Models

In the Lab or in the shop . . . the highest degree of accuracy in seconds . . . lowers inspection costs by saving time . . . New system available to retrofit or exchange for Starrett-Webber Optical Height Gages now in use . . .

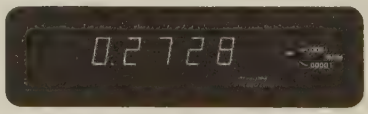


EASY TO READ

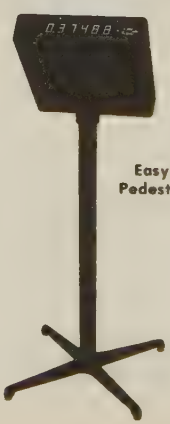
DIGITAL DISPLAY NUMBERS 5/8 INCH HIGH



Readout to twenty millionths of an inch
.000020"



Readout to tenths of one thousandth of an inch
.0001"
(Metric model readout 0.0005 mm or 0.001 mm)



Easy to place Pedestal Console

Simple Two-Step Operation in less than 10 seconds . . .

1. Set Rapid Positioner to within .005" (3 seconds)
2. Final setting (5 seconds)

Digi-Chek®II—Cont.

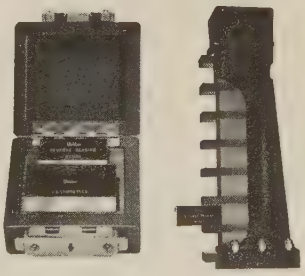
Specifications

		ENGLISH	METRIC
Accuracy	Master Gage Block Stack	+ .000004"	+ .0001 mm
		− .000000 per inch	− .0000 per 25 mm
	Measuring System	.00005" T.I.R.	.00125 mm T.I.R.
Resolution		.000020"	0.0005 mm
		or	or
		.0001"	.001 mm
Repeatability		.000020"	.0005 mm
Measuring System		Solid state with power failure flashing display	
Digital Readout		⅝" high numerals— Coplanar display	
Readout Pedestal Height		38 inches	
Power Supply		Switchable 115V. 60 cycle or 220V. 50 cycle	
Connecting Cords		Power supply to console 8 ft.	
		DIGI-CHEK II to console 6 ft.	

Standard equipment: pedestal stand for readout unit, DIGI-CHEK II plastic dust cover, shipping/storage case, sample container M-1® rust preventive.

Optional equipment:

CAT. NO.	
HG 525.60 (Eng.) HG 501.3M (Metric)	Reverse reading block.
HG 525.61 (Eng.) HG 501.4M (Metric)	One inch or 25 mm base block for use with reverse reading block to set dial bore gages.
HG 525.60A (Eng. only)	Reverse reading block with 17/64" tie rod hole for temporary extension of capacity with square style gage blocks.
CS 9133.	Case for reverse reading and base block.



Reverse reading block permits fast, easy readings from under side of block.

6 Models in English

CAT. NO.	CAPACITY
DHG 25.	**1" to 25"**
DHG 37.	**1" to 37"**
DHG 49.	**1" to 49"**
DHG 61.	**1" to 61"**
DHG 73.	**1" to 73"**
DHG 85.	**1" to 85"**

5 Models in Metric

CAT. NO.	CAPACITY
DHG 625.	**25 mm to 625 mm**
DHG 1025.	**25 mm to 1025 mm**
DHG 1225.	**25 mm to 1225 mm**
DHG 1550.	**25 mm to 1550 mm**
DHG 2150.	**25 mm to 2150 mm**

For information concerning retrofit or exchange of your Starrett-Webber Optical Height Gages now in use, contact your Starrett-Webber Distributor.

Multi-Chek

Length and Diameter Setting Machines
48" to 240" (1200 to 6000 mm) Capacity

Set I.D. or O.D. indicating diameter gage in one minute regardless of the measuring depth (within 6" depth range)

Check your end measuring standards in your own plant.

Check large plug gages— that are oversize for present equipment.

240" Model illustrated (6000mm)

* INDUCTOSYN DIGITAL READOUT

* DUPLEX ENGLISH/METRIC MEASUREMENT

Accuracy of machine (All Models) ±.0001"(.001mm) + $\frac{\text{Length in inches}}{250{,}000}$

Setting Graduations (Readout) . . . . . .0001"(.001mm)

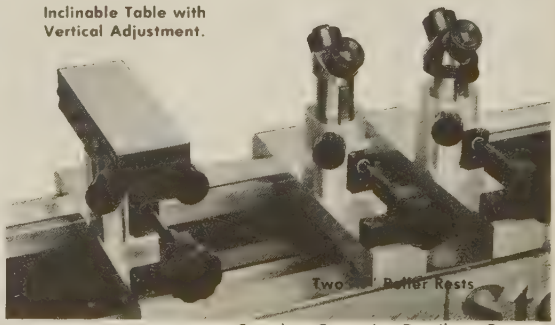
OPTIONAL LENGTH MEASURING PACKAGE

Stationary Anvil

Measuring Anvil with Null Indicator with Adjustable Measuring Pressure 2 to 40 oz.

The Multi Check Length Measuring Package is furnished in a fitted case.

Inclinable Table with Vertical Adjustment.



Two [illegible] Roller Rests

Complete Operating Details on Request.

Gage Block Inspection Service

Our Inspection Service catches worn gage blocks before trouble starts . . . eliminates costly production inaccuracies. Be sure to have your gage blocks checked regularly!

Webber Gage Division offers all gage block users a complete inspection service, as insurance against production inaccuracies.

Any brand of used rectangular, square or angle gage blocks will be calibrated, and the deviation from the marked size of each block will be shown on a Certificate of Inspection. All linear measurements are based on the new International Inch or the Meter.

This gage block inspection service is done promptly, and blocks are ready to be returned to you within a very few days after their receipt by Webber.

1. After your gage block set arrives in the Webber shipping room it is given a test number, and each block is cleaned ultrasonically (by means of high frequency sound waves) to remove oil, grease and film. The case is also cleaned thoroughly.

2. Next, each block is tested for "wringability," and all nicks or burrs which might impair accuracy are removed.

3. Individual rectangular and square blocks are then compared with master* blocks which are accurate to fractions of one millionth of an International Inch. (Webber Grand Master* Blocks are calibrated yearly, both by Webber's own Interferometer which uses the wavelength of light as its measuring standard, and by the United States Bureau of Standards.)

4. A Certificate of Inspection is automatically typewritten by the electronic comparator, to assure complete accuracy in recording gage block sizes. This Certificate shows the deviation from the marked size of each block to the 6th decimal place (based on the new International Inch), and marks those sizes which need replacing.

NOTE: Blocks are checked only for their original accuracy.

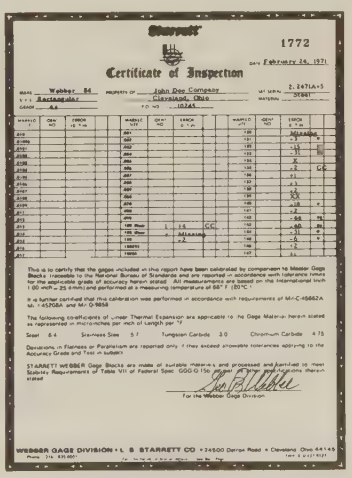
*All Masters and Grand Masters are Webber **croblox** (solid chrome carbide) and therefore are longer wearing and more stable than hardened steel Masters.

5. A quotation showing the costs in both steel and croblox (solid chrome carbide) of any recommended replacements is then prepared.

6. Depending on your wishes, the blocks are either packed and returned to you with the Certificate and replacement list, or held for your approval of the replacements.

7. If you authorize the replacements, your Certificate of Inspection is then marked to indicate which blocks were replaced, and the date of replacement. However, if you wish new blocks certified, a new Certificate of Inspection (which includes all old and new blocks) will be made, at extra cost.

Write for a copy of "Questions and Answers—Gage Block Service."


Starrett

1772

Certificate of Inspection

Date February 24, 1971

Webber 84

Rectangular

Grade AA

Property of John Doe Company
Cleveland, Ohio
P.O. No. 10245

S. 2471LA+5

Starrett

This is to certify that the gages included in the report have been calibrated by comparison to Master Gage Blocks traceable to the National Bureau of Standards and are reported in accordance with tolerances for the applicable grade of accuracy herein stated. All measurements are based on the International Inch (1.00 inch = 25.4mm) and performed at a measuring temperature of 68° F (20°C).

It is further certified that this calibration was performed in accordance with requirements of Mil-C-45662A Mil-STD-45 and Mil-G-9858

The following coefficients of Linear Thermal Expansion are applicable to the Gage Material herein stated as represented in micro-inches per inch of Length per °F

Steel 6.4 Stainless Steel 5.7 Tungsten Carbide 3.0 Chromium Carbide 4.75

Deviations in Flatness or Parallelism are reported only if they exceed allowable tolerances applying to the Accuracy Grade and Test in subject.

STARRETT WEBBER Gage Blocks are made of suitable materials and processed and handled to meet Stability Requirements of Table VIII of Federal Spec. GGG-G-15c. The gages listed on this Certificate, unless otherwise stated

For the Webber Gage Division

WEBBER GAGE DIVISION • L. S. STARRETT CO. • 24500 Detroit Road • Cleveland, Ohio 44145

Inspection Service. In sending gage blocks to the Webber Gage Division for inspection, please specify whether we are to (A) inspect, issue certificate and return only; (B) inspect, advise condition and hold for instructions; or (C) inspect, replace worn blocks and return. If order specifies that worn blocks should be replaced, and the cost of replacement approaches that of a new set, we will so inform you, quote prices and wait for instructions.

Gage Block Inspection Service

Webber Inspection Accuracy

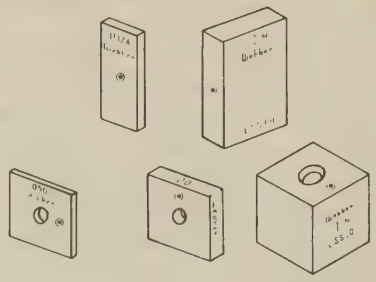
Readings on all blocks of Grade 3 and 2 are accurate to .000002"*. Readings on Grade 1 gage blocks are accurate within .000001"*; and "Laboratory Master" or accuracy Grade 0.5 inspections (which are performed only on Webber **croblox** Gage Blocks originally sold as "Laboratory Master" blocks) are accurate to .0000008" (8/10 of a millionth).

Readings for accuracy are taken at the points indicated in the sketches. On rectangular blocks, the measured length of each block is the perpendicular distance between gaging surfaces at the center of the gaging surfaces.

On square blocks readings are taken (as shown).

For obvious reasons, Webber does not inspect new gage blocks of other brands.

Reference Points

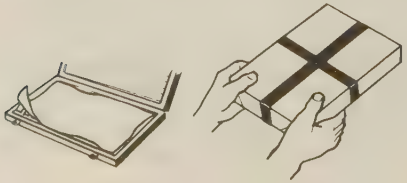


*Blocks on which flatness, parallelism and surface finish are worn excessively cannot be calibrated to an accuracy greater than .000005" per inch of length and are identified by the figure "t" on the Certificate of Inspection.

Example of set damaged in transit due to improper packaging.

Remember, gage block cases are made for immobile storage—not as shipping crates.

Follow these steps in preparing your gage blocks for shipment:



SHIPPING DAMAGE IS COSTLY AND AN INCONVENIENCE TO EVERYONE . . . PROTECT YOUR VALUABLE GAGE BLOCKS BY PROPER PACKAGING

1. Gage blocks should be treated with a rust preventive such as Starrett M-1.
2. Place waxpaper over the blocks.
3. If necessary, place Kimpak or similar cushioning inside lid to prevent jiggling of blocks in the inserts. DO NOT FORCE LID CLOSED.
4. Seal the closed case with nylon or fiberglas reinforced heavy tape. The clasp will not hold in shipping nor will paper tape.
5. Use a strong outer shipping container large enough to allow sufficient, firm cushioning material to withstand shock in transit.
6. Mark outer carton plainly, "DELICATE INSTRUMENTS—FRAGILE."

Starrett®

Granite Surface Plates

Technical Data

Every linear measurement depends on an accurate reference surface from which final dimensions are taken. Starrett Precision Granite Surface Plates provide this reference plane for work inspection and for work layout prior to machining. Their high degree of flatness, overall quality and workmanship also make them ideal bases for mounting sophisticated mechanical, electronic and optical gaging systems.

Granite Types. The Starrett Granite Surface Plate Division produces surface plates from three types of granite—Starrett MASTER PINK, Starrett CRYSTAL PINK and Starrett Black Gabbro. The following is a comparison of these granites and their characteristics with black diabase and California black gabbro:

Granite	Mica	Crystalline Quartz	Modulus of Elasticity
Starrett MASTER PINK	0.4%	32.1%	5.5×10^6
Starrett CRYSTAL PINK	0.8%	32.8%	3.8×10^6
Starrett Black Gabbro	None	None	12.5×10^6
Black Diabase	Trace	None	9.0×10^6
California Black Gabbro	Trace	None	11.5×10^6

Rule of thumb: when the surface plate is to be used as a reference and measuring surface, always pick a quartz granite; if the plate is to be used primarily for load carrying, a non-quartz or black gabbro may be chosen.

The most important element in the performance and life of granite surface plates is percentage of quartz. Quartz is more than twice as resistant to wear as the other minerals in granite. It provides bearing points of hard, highly polished, smooth character which protect the accuracy and finish of both the surface plate and the tools and instruments used on it. In addition to crystalline quartz, MASTER PINK has a most unusually hard quartz-type bond between the crystals, providing the most wear resistant surface known in natural granite. Indewpendent laboratory tests of this feature are available to show that a slightly higher original investment in MASTER PINK can result in an average of 60% less resurfacing and maintenance cost. This means real economy when maintenance alone on the average block granite plate application amounts conservatively to 150–250% of its price in ten years.

Material. Starrett raw material for granite plates has been selected for best balance of physical properties including maximum resistance to wear and to meet or exceed federal and foreign specifications for deflection under load. Each plate has been lapped to a fine microinch finish to minimize tool wear and to minimize drag.

Accuracy Under Load. Starrett CRYSTAL PINK and Black Granite plates have a thickness capable of supporting a total normal load equal to 50 lb. for each square foot of surface area loaded in the center of the plate—without deflecting the plate along a diagonal more than one-half the flatness tolerance. This is the accepted rating in Federal Specification GGG-P-463.

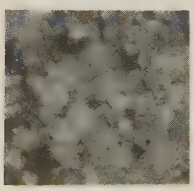
Starrett MASTER PINK plates meet or exceed twice this requirement, meeting a 100 lb. test for each square foot of surface area.

In situations where abnormal loading conditions are anticipated, Starrett can engineer and modify surface plate thickness to meet any requirement.

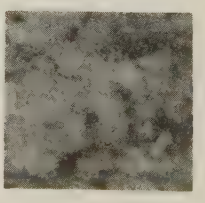
Ledges. Surface plates without work clamping ledges are recommended for sustained accuracy and reliability. Excessive torque in applying clamps to ledges can adversely affect measurements taken near the plate edges. If clamping is important, T-slots and threaded metal inserts may be machined into the surface as shown on page 412.

Specifications. Starrett Granite Surface Plates meet or exceed Federal Specification GGG-P-463.

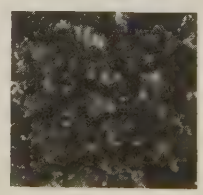
MASTER PINK



CRYSTAL PINK



Black



Technical Data

Tolerance. Starrett Granite Surface Plates are manufactured in three grades of tolerance:

GRADE AA is equal to **laboratory** grade. It is specified typically for precision operations in constant temperature gaging rooms and metrology departments.

GRADE A is equal to **inspection** grade. It is specified typically for general work in quality control.

GRADE B is equal to **toolroom** grade. It is specified typically for production checking work throughout the shop.

Unilateral Flatness Tolerance. Overall flatness tolerance is based on unilateral measurement, and all points on the work surface shall be contained between two parallel planes separated a distance no greater than the amount specified for each particular grade and size shown. Starrett flatness tolerances meet or exceed Federal Specification GGG-P-463c.

Repeat Reading Tolerance. In addition to overall flatness tolerance referred to above, Starrett provides repeat reading tolerances as follows:

Diagonal Inches	Full Indicator Movement (FIM) in Microinches (millionths)		
	GRADE AA	GRADE A	GRADE B
thru 30	35	60	110
30 to 60	45	70	120
60 to 90	60	80	160
90 to 120	75	100	200
120 to 150	90	120	240
over 150	100	140	280

A repeat reading gage detects minute variations of the surface within the unilateral flatness tolerance of the whole surface.

Repeat reading tolerance is easily checked with the Starrett Repeat Reading Gage, page 416 or with a height gage and indicator. The indicator should extend beyond the base of the height gage an amount equal to the length of the base (resulting in a 1 to 1 ratio) which will then repeat the measurement anywhere on the work surface within the total indicator reading.

Registered Accuracy. Before shipment, each Starrett Granite Surface Plate must pass a critical final inspection to prove that its entire surface is within specified tolerance. The final inspection is by autocollimator in a controlled atmosphere. This instrument is checked and certified against standards traceable to the National Bureau of Standards, with certification on file at the Starrett Granite Surface Plate Division main office in Mount Airy, N. C.

All shipments of Starrett precision Granite products include a Certificate of Standards which guarantees accuracy and verifies traceability to the National Bureau of Standards as well as certifying that the requirements of MIL-STD-45662, MIL-I-45208A and MIL-Q-9858A have been met.

Periodic Inspection. Every surface plate in use should be frequently inspected, particularly under shop conditions where abrasion is a fact of gaging life. An effective inspection program should include regular checks with an autocollimator. If tolerance variations are excessive, a plate can be transferred to work involving less accuracy, or it can be relapped to restore its original level of accuracy.

Relapping. Relapping facilities for Starrett and other makes of granite surface plates are located in Mt. Airy, N. C. In-plant relapping services are available, too. For details refer to page 418.

Engineering Services. Starrett engineers will provide prompt assistance on any problem related to surface plate design, installation and use. To get the best service and value from any granite plate, we invite you to contact the Granite Surface Plate Division.

MASTER PINK® Granite Surface Plates

Top of the Line—Specified for Metrology Laboratories Critical Quality Control Applications and for Inspection Work in Abrasive Environments

- ★ **Meets or exceeds Federal specifications for flatness—right to each edge.**
- ★ **Diamond-like hardness—most wear resistant surface of all quartz granites.**
- ★ **Smooth, jewel-like quartz bearing points protect accuracy and finish of both surface and tools used on it.**
- ★ **Strongest of all standard size quartz granite plates—meets or exceeds 100 lb. per square foot load support.**
- ★ **Industry's finest foundation for precise measurements.**

MASTER PINK is the finest, most durable granite surface plate available to industry today. From every point of view—flatness, wear life, surface finish and accuracy under load—MASTER PINK delivers the best performance and value of all surface plate materials.

Flatness. MASTER PINK meets or exceeds the unilateral flatness tolerances in Federal Specification GGG-P-463c—and because of its high percentage of large quartz crystals, maintains this accuracy longer than other surface plate materials in normal daily use.

Wear Life. Records of surface plate performance in customer plants show that non-quartz-bearing granite in average daily use requires relapping about once a year. MASTER PINK plates in these same plants have required relapping once every five years. This adds up to real money saving in the long run since resurfacing can amount to as much as one third of the original plate cost each time it is done.

Surface Finish. The precision lapped surface of MASTER PINK, with its even distribution of large quartz crystals, provides a smooth, jewel bearing finish which practically eliminates wear on both the surface plate and instruments used on it. This fine micro-finish, combined with the natural voids in the surface, prevents wringing and provides a velvety smooth tool action.

Accuracy Under Load. MASTER PINK has the highest modulus of rigidity for quartz granites and will take a 100 lb. per square foot concentrated load without deflecting more than half the flatness tolerance specified. This is twice the resistance to deflection under load as required by Federal Specification. See page 400 for more detailed explanation.

MASTER PINK® Granite Surface Plates—Cont.

How to Order. Specify (1) surface size of plate, (2) grade AA or A tolerance and (3) number of ledges—two, four or none. Standard size plates are mounted on resilient support pads, providing isolation from normal vibration and a non-distorting 3-point suspension. Packed one in a crate with skids for fork-lift handling.

Available No Ledge—2 Ledge—4 Ledge

Surface Size		Flatness Unilateral Tolerance		Thickness		Weight		EDP Number
In.	mm	In.	mm	In.	mm	Lb.	kg	
Grade AA—Laboratory—No Ledge								
12 x 12	300 x 300	.000050	.0012	4	100	55	25	80301
12 x 18	300 x 450	.000050	.0012	4	100	85	39	80310
18 x 18	450 x 450	.000050	.0012	4	100	125	57	80319
18 x 24	450 x 600	.000065	.0016	6	150	248	113	80328
24 x 24	600 x 600	.000070	.0017	6	150	330	150	80346
24 x 36	600 x 900	.000085	.0021	8	200	660	299	80355
36 x 36	900 x 900	.0001	.0025	8	200	990	449	80401
36 x 48	900 x 1200	.00015	.0038	8	200	1320	599	80410
36 x 60	900 x 1500	.0002	.0050	10	250	2065	937	80419
36 x 72	900 x 1800	.00025	.0063	12	300	2970	1347	80428
48 x 72	1200 x 1800	.0003	.0076	12	300	3960	1796	80455
48 x 96	1200 x 2400	.0004	.0101	16	400	7040	3193	80473
Grade A—Inspection—No Ledge								
12 x 12	300 x 300	.0001	.0025	4	100	55	25	80304
12 x 18	300 x 450	.0001	.0025	4	100	85	39	80313
18 x 18	450 x 450	.0001	.0025	4	100	125	57	80322
18 x 24	450 x 600	.00013	.0033	6	150	248	113	80331
24 x 24	600 x 600	.00014	.0035	6	150	330	150	80349
24 x 36	600 x 900	.00017	.0043	6	150	495	225	80358
36 x 36	900 x 900	.0002	.0050	6	150	745	338	80404
36 x 48	900 x 1200	.0003	.0076	8	200	1320	599	80413
36 x 60	900 x 1500	.0004	.0101	10	250	2065	937	80422
36 x 72	900 x 1800	.0005	.0125	10	250	2475	1123	80431
48 x 72	1200 x 1800	.0006	.0152	10	250	3300	1497	80458
48 x 96	1200 x 2400	.0008	.0203	14	350	6160	2794	80476
Grade AA—Laboratory—Two Ledge								
12 x 12	300 x 300	.000050	.0012	4	100	50	23	80302
12 x 18	300 x 450	.000050	.0012	4	100	78	35	80311
18 x 18	450 x 450	.000050	.0012	4	100	120	54	80320
18 x 24	450 x 600	.000065	.0016	6	150	224	102	80329
24 x 24	600 x 600	.000070	.0017	6	150	306	139	80347
24 x 36	600 x 900	.000085	.0021	8	200	605	274	80356
36 x 36	900 x 900	.0001	.0025	8	200	935	424	80402
36 x 48	900 x 1200	.00015	.0038	8	200	1250	567	80411
36 x 60	900 x 1500	.0002	.0050	10	250	1950	885	80420
36 x 72	900 x 1800	.00025	.0063	12	300	2810	1275	80429
48 x 72	1200 x 1800	.0003	.0076	12	300	3795	1721	80456
48 x 96	1200 x 2400	.0004	.0101	16	400	6750	3062	80474

Note: Sizes other than listed above available to order.

MASTER PINK® Granite Surface Plates—Cont.

Available No Ledge—2 Ledge—4 Ledge

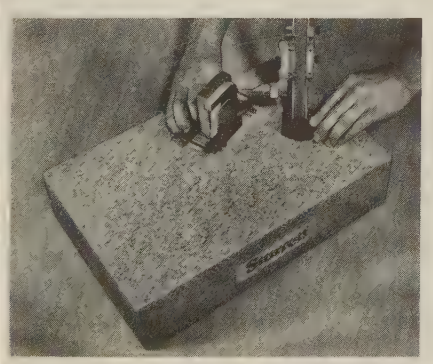
Surface Size		Flatness Unilateral Tolerance		Thickness		Weight		EDP Number
In.	mm	In.	mm	In.	mm	Lb.	kg	
Grade A—Inspection—Two Ledge								
12 x 12	300 x 300	.0001	.0025	4	100	50	23	80305
12 x 18	300 x 450	.0001	.0025	4	100	78	35	80314
18 x 18	450 x 450	.0001	.0025	4	100	120	54	80323
18 x 24	450 x 600	.00013	.0033	6	150	224	102	80332
24 x 24	600 x 600	.00014	.0035	6	150	306	139	80350
24 x 36	600 x 900	.00017	.0043	6	150	460	209	80359
36 x 36	900 x 900	.0002	.0050	6	150	710	322	80405
36 x 48	900 x 1200	.0003	.0076	8	200	1250	567	80414
36 x 60	900 x 1500	.0004	.0101	10	250	1950	885	80423
36 x 72	900 x 1800	.0005	.0125	10	250	2340	1061	80432
48 x 72	1200 x 1800	.0006	.0152	10	250	3165	1436	80459
48 x 96	1200 x 2400	.0008	.0203	14	350	5905	2679	80477
Grade AA—Laboratory—Four Ledge								
12 x 12	300 x 300	.000050	.0012	4	100	46	21	80303
12 x 18	300 x 450	.000050	.0012	4	100	74	34	80312
18 x 18	450 x 450	.000050	.0012	4	100	115	52	80321
18 x 24	450 x 600	.000065	.0016	6	150	206	93	80330
24 x 24	600 x 600	.000070	.0017	6	150	288	131	80348
24 x 36	600 x 900	.000085	.0021	8	200	575	261	80357
36 x 36	900 x 900	.0001	.0025	8	200	885	401	80403
36 x 48	900 x 1200	.00015	.0038	8	200	1200	544	80412
36 x 60	900 x 1500	.0002	.0050	10	250	1890	857	80421
36 x 72	900 x 1800	.00025	.0063	12	300	2735	1241	80430
48 x 72	1200 x 1800	.0003	.0076	12	300	3695	1676	80457
48 x 96	1200 x 2400	.0004	.0101	16	400	6615	3001	80475
Grade A—Inspection—Four Ledge								
12 x 12	300 x 300	.0001	.0025	4	100	46	21	80306
12 x 18	300 x 450	.0001	.0025	4	100	74	34	80315
18 x 18	450 x 450	.0001	.0025	4	100	115	52	80324
18 x 24	450 x 600	.00013	.0033	6	150	206	93	80333
24 x 24	600 x 600	.00014	.0035	6	150	288	131	80351
24 x 36	600 x 900	.00017	.0043	6	150	440	200	80360
36 x 36	900 x 900	.0002	.0050	6	150	680	308	80406
36 x 48	900 x 1200	.0003	.0076	8	200	1200	544	80415
36 x 60	900 x 1500	.0004	.0101	10	250	1890	857	80424
36 x 72	900 x 1800	.0005	.0125	10	250	2275	1032	80433
48 x 72	1200 x 1800	.0006	.0152	10	250	3080	1397	80460
48 x 96	1200 x 2400	.0008	.0203	14	350	5785	2624	80478

Note: Sizes other than listed above available to order.

CRYSTAL PINK Granite Surface Plates

Specified for General Inspection Work and for Working Plates Throughout the Shop

- ★ **Meets or exceeds Federal specifications for flatness—right to each edge.**
- ★ **Great surface hardness and wear resistance—highest percent of quartz crystals of any granite plate.**
- ★ **Smooth, jewel-like quartz bearing points protect accuracy and finish of both surface and tools used on it.**
- ★ **Quality and economy combined.**
- ★ **Competes directly with black granite plates while outlasting them as much as 5 to 1.**
- ★ **Meets or exceeds 50 lb. per square foot load bearing specifications. Available in 100 lb. test series.**



CRYSTAL PINK draws its name from the fact that it has the highest crystalline quartz content of any granite surface plate. In terms of overall quality and performance, it surpasses all other surface plates—except the incomparable MASTER PINK.

CRYSTAL PINK's unilateral flatness tolerance meets or exceeds Federal Specification GGG-P-463c—and because of its high percentage of large quartz crystals, maintains this accuracy through the most severe use. The uniform distribution of these crystals gives the surface great hardness and wear resistance . . . plus a jewel bearing finish that minimizes tool drag and wear while assuring a smooth sliding action for instruments used in inspection work.

Because CRYSTAL PINK is easier than MASTER PINK to quarry and manufacture, its price is significantly lower. It competes directly with black granite plates while performance-wise it outlasts them as much as 5 to 1. For surface plate users who prefer black, CRYSTAL PINK can be treated with a deep-penetrating black dye.

CRYSTAL PINK plates are ruggedly made to meet or surpass requirements of Federal Specification GGG-P-463c for ability to take a 50 lb. per square foot concentrated load and not deflect more than one-half of flatness tolerance as explained on page 401. They can also be manufactured to meet 100 lb. per square foot loading.

CRYSTAL PINK Granite Surface Plates—Cont.

Orders should specify (1) surface size of plate, (2) grade AA, A or B tolerance and (3) number of ledges—two or none. Standard size plates are mounted on resilient support pads, providing isolation from normal vibration and a non-distorting 3-point suspension. Packed one in a crate with skids for fork-lift handling.

We Build Specials, Too. With Starrett, there's no limit on granite surface plate configuration or engineering service. If you have an oversize workpiece to inspect, we'll design and build the oversize plate you need to stage it. It will be a *single slab* of granite from our own quarry in Salisbury, N. C., machined, finished and inspected to deliver the results you want. We can also modify any size plate to accept threaded inserts, T-slots and other work-holding and locating features. See pages 411 and 412 for details.

Available No Ledge or 2 Ledge

Surface Size		Flatness Unilateral Tolerance		Thickness		Weight		EDP Number
In.	mm	In.	mm	In.	mm	Lb.	kg	
Grade AA—Laboratory—No Ledge								
12 x 12	300 x 300	.000050	0.0012	4	100	55	25	80601
12 x 18	300 x 450	.000050	0.0012	4	100	85	39	80610
18 x 18	450 x 450	.000050	0.0012	4	100	125	57	80619
18 x 24	450 x 600	.000065	0.0016	6	150	248	113	80628
24 x 24	600 x 600	.000070	0.0017	6	150	330	150	80646
24 x 36	600 x 900	.000085	0.0021	6	150	495	225	80655
36 x 36	900 x 900	.0001	0.0025	6	150	745	338	80701
36 x 48	900 x 1200	.00015	0.0038	8	200	1320	599	80710
36 x 60	900 x 1500	.0002	0.0050	10	250	2065	937	80719
36 x 72	900 x 1800	.00025	0.0063	12	300	2970	1347	80728
48 x 72	1200 x 1800	.0003	0.0076	12	300	3960	1796	80755
48 x 96	1200 x 2400	.0004	0.0101	16	400	7040	3193	80773
60 x 120	1500 x 3000	.0007	0.0177	18	450	12375	5613	80819
72 x 96	1800 x 2400	.0005	0.0125	16	400	10560	4790	80837
72 x 144	1800 x 3600	.001	0.0254	20	500	19800	8981	80855
Grade A—Inspection—No Ledge								
12 x 12	300 x 300	.0001	0.0025	4	100	55	25	80604
12 x 18	300 x 450	.0001	0.0025	4	100	85	39	80613
18 x 18	450 x 450	.0001	0.0025	4	100	125	57	80622
18 x 24	450 x 600	.00013	0.0033	6	150	248	113	80631
24 x 24	600 x 600	.00014	0.0035	6	150	330	150	80649
24 x 36	600 x 900	.00017	0.0043	6	150	495	225	80658
36 x 36	900 x 900	.0002	0.0050	6	150	745	328	80704
36 x 48	900 x 1200	.0003	0.0076	8	200	1320	599	80713
36 x 60	900 x 1500	.0004	0.0101	10	250	2065	937	80722
36 x 72	900 x 1800	.0005	0.0125	10	250	2475	1123	80731
48 x 72	1200 x 1800	.0006	0.0152	10	250	3300	1497	80758
48 x 96	1200 x 2400	.0008	0.0203	12	300	5280	2395	80776
60 x 120	1500 x 3000	.0015	0.0381	14	350	9625	4366	80822
72 x 96	1800 x 2400	.001	0.0254	12	300	7920	3593	80840
72 x 144	1800 x 3600	.002	0.0508	16	400	15840	7185	80858

Note: Sizes other than listed above available to order.

Continued Next Page

CRYSTAL PINK Granite Surface Plates—Cont.

Available No Ledge or 2 Ledge

Surface Size		Flatness Unilateral Tolerance		Thickness		Weight		EDP Number
In.	mm	In.	mm	In.	mm	Lb.	kg	
Grade B—Toolroom—No Ledge								
12 x 12	300 x 300	.0002	0.0050	4	100	55	25	80607
12 x 18	300 x 450	.0002	0.0050	4	100	85	39	80616
18 x 18	450 x 450	.0002	0.0050	4	100	125	57	80625
18 x 24	450 x 600	.00026	0.0066	4	100	165	75	80634
24 x 24	600 x 600	.00028	0.0071	4	100	220	100	80652
24 x 36	600 x 900	.00034	0.0086	6	150	495	225	80661
36 x 36	900 x 900	.0004	0.0101	6	150	745	338	80707
36 x 48	900 x 1200	.0005	0.0125	6	150	990	449	80716
36 x 60	900 x 1500	.0007	0.0177	8	200	1650	749	80725
36 x 72	900 x 1800	.001	0.0254	8	200	1980	898	80734
48 x 72	1200 x 1800	.001	0.0254	8	200	2640	1198	80761
48 x 96	1200 x 2400	.0015	0.0381	10	250	4400	1996	80779
60 x 120	1500 x 3000	.003	0.0762	12	300	8250	3742	80825
72 x 96	1800 x 2400	.002	0.0508	10	250	6600	2994	80843
72 x 144	1800 x 3600	.004	0.1016	14	350	13860	6287	80861
Grade AA—Laboratory—Two Ledge								
12 x 12	300 x 300	.000050	0.0012	4	100	50	23	80602
12 x 18	300 x 450	.000050	0.0012	4	100	78	35	80611
18 x 18	450 x 450	.000050	0.0012	4	100	120	54	80620
18 x 24	450 x 600	.000065	0.0016	6	150	224	102	80629
24 x 24	600 x 600	.000070	0.0017	6	150	306	139	80647
24 x 36	600 x 900	.000085	0.0021	6	150	460	209	80656
36 x 36	900 x 900	.0001	0.0025	6	150	710	322	80702
36 x 48	900 x 1200	.00015	0.0038	8	200	1250	567	80711
36 x 60	900 x 1500	.0002	0.0050	10	250	1950	885	80720
36 x 72	900 x 1800	.00025	0.0063	12	300	2810	1275	80729
48 x 72	1200 x 1800	.0003	0.0076	12	300	3795	1721	80756
48 x 96	1200 x 2400	.0004	0.0101	16	400	6750	3062	80774
60 x 120	1500 x 3000	.0007	0.0177	18	450	11965	5427	80820
72 x 96	1800 x 2400	.0005	0.0125	16	400	10270	4658	80838
72 x 144	1800 x 3600	.001	0.0254	20	500	19250	8732	80856
Grade A—Inspection—Two Ledge								
12 x 12	300 x 300	.0001	0.0025	4	100	50	23	80605
12 x 18	300 x 450	.0001	0.0025	4	100	78	35	80614
18 x 18	450 x 450	.0001	0.0025	4	100	120	54	80623
18 x 24	450 x 600	.00013	0.0033	6	150	224	102	80632
24 x 24	600 x 600	.00014	0.0035	6	150	306	139	80650
24 x 36	600 x 900	.00017	0.0043	6	150	460	209	80659
36 x 36	900 x 900	.0002	0.0050	6	150	710	322	80705
36 x 48	900 x 1200	.0003	0.0076	8	200	1250	567	80714
36 x 60	900 x 1500	.0004	0.0101	10	250	1950	885	80723
36 x 72	900 x 1800	.0005	0.0125	10	250	2340	1061	80732
48 x 72	1200 x 1800	.0006	0.0152	10	250	3165	1436	80759
48 x 96	1200 x 2400	.0008	0.0203	12	300	5060	2295	80777
60 x 120	1500 x 3000	.0015	0.0381	14	350	9310	4223	80823
72 x 96	1800 x 2400	.001	0.0254	12	300	7700	3493	80841
72 x 144	1800 x 3600	.002	0.0508	16	400	15400	6985	80859

Note: Sizes other than listed above available to order.

Continued Next Page

CRYSTAL PINK Granite Surface Plates—Cont.

Available No Ledge or 2 Ledge

Surface Size		Flatness Unilateral Tolerance		Thickness		Weight		EDP No.
In.	mm	In.	mm	In.	mm	Lb.	kg	
Grade B—Toolroom—Two Ledge								
12 x 12	300 x 300	.0002	0.0050	4	100	50	23	80608
12 x 18	300 x 450	.0002	0.0050	4	100	76	34	80617
18 x 18	450 x 450	.0002	0.0050	4	100	118	54	80626
18 x 24	450 x 600	.00026	0.0066	4	100	155	70	80635
24 x 24	600 x 600	.00028	0.0071	4	100	210	95	80653
24 x 36	600 x 900	.00034	0.0086	6	150	460	209	80662
36 x 36	900 x 900	.0004	0.0101	6	150	710	322	80708
36 x 48	900 x 1200	.0005	0.0125	6	150	955	433	80717
36 x 60	900 x 1500	.0007	0.0177	8	200	1560	708	80726
36 x 72	900 x 1800	.001	0.0254	8	200	1870	848	80735
48 x 72	1200 x 1800	.001	0.0254	8	200	2530	1148	80762
48 x 96	1200 x 2400	.0015	0.0381	10	250	4215	1912	80780
60 x 120	1500 x 3000	.003	0.0762	12	300	7975	3617	80826
72 x 96	1800 x 2400	.002	0.0508	10	250	6415	2910	80844
72 x 144	1800 x 3600	.004	0.1016	14	350	13475	6112	80862

Note: Sizes other than listed above available to order.

Black Granite Surface Plates

Specified for General Inspection Work, for Working Plates Throughout the Shop and for Load Carrying Applications

The properties of black granite surface plates include a high modulus of rigidity, tight porosity and a very fine grain. Since they contain no crystalline quartz, their wear life is less than that of MASTER PINK or CRYSTAL PINK. They do, however, take a very fine finish and meet flatness requirements equally well.

Their high modulus of rigidity allows black granite plates to be made thinner, and they will take a 50 lb. per square foot concentrated load per Federal Specification and not deflect more than half the flatness tolerance specified. Thicker plates designed for 100 lb. per square foot loading are available to order.

Black Granite Surface Plates—Cont.

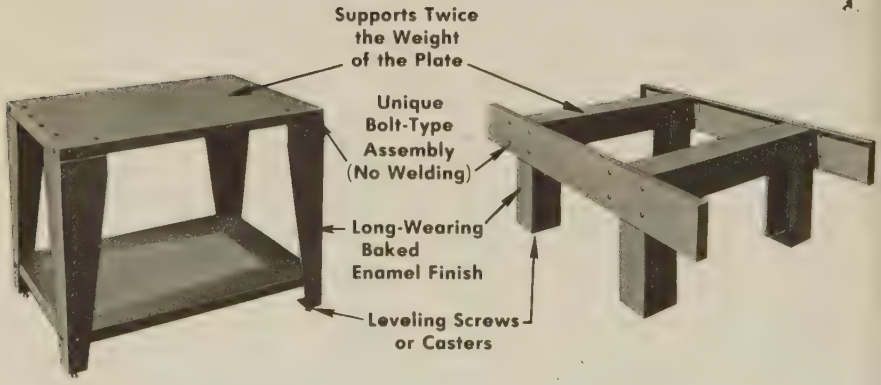
Orders should specify (1) surface size, (2) grade AA, A or B tolerance and (3) number of ledges—two or none. Standard size plates are mounted on resilient support pads, providing isolation from normal vibration and a non-distorting 3-point suspension. Packed one in a crate with skids for fork-lift handling.

We Build Specials. There's no limit on surface plate size, configuration. We can design, machine and finish granite plates for load carrying applications such as machine beds and fixture bases—or modify any size plate to accept threaded inserts. T-slots, other work-holding and locating features. See page 412 for details.

Available No Ledge or 2 Ledge

Surface Size		Flatness Unilateral Tolerance		Thickness		Weight		EDP Number
In.	mm	In.	mm	In.	mm	Lb.	kg	
Grade AA—Laboratory—No Ledge								
12 x 18	300 x 450	.00005	0.0012	4	100	95	43	85010
18 x 24	450 x 600	.000065	0.0016	4	100	190	86	85028
24 x 36	600 x 900	.000085	0.0021	6	150	520	236	85055
30 x 48	750 x 1200	.00015	0.0038	6	150	950	431	85082
36 x 48	900 x 1200	.00015	0.0038	6	150	1140	517	85110
36 x 72	900 x 1800	.00025	0.0063	10	250	2850	1293	85128
48 x 72	1200 x 1800	.0003	0.0076	8	200	3040	1379	85155
48 x 96	1200 x 2400	.0004	0.0101	12	300	6080	2758	85173
Grade A—Inspection—No Ledge								
12 x 18	300 x 450	.0001	0.0025	4	100	95	43	85013
18 x 24	450 x 600	.00013	0.0033	4	100	190	86	85031
24 x 36	600 x 900	.00017	0.0043	4	100	380	172	85058
30 x 48	750 x 1200	.0003	0.0076	6	150	950	430	85085
36 x 48	900 x 1200	.0003	0.0076	6	150	1140	517	85113
36 x 72	900 x 1800	.0005	0.0125	8	200	2280	1034	85131
48 x 72	1200 x 1800	.0006	0.0152	8	200	3040	1379	85158
48 x 96	1200 x 2400	.0008	0.0203	10	250	5070	2300	85176
Grade B—Toolroom—No Ledge								
12 x 18	300 x 450	.0002	0.0050	3	75	72	33	85016
18 x 24	450 x 600	.00026	0.0066	3	75	143	65	85034
24 x 36	600 x 900	.00034	0.0086	4	100	380	172	85061
30 x 48	750 x 1200	.0005	0.0125	4	100	640	290	85088
36 x 48	900 x 1200	.0005	0.0125	4	100	760	345	85116
36 x 72	900 x 1800	.001	0.0254	6	150	1710	776	85134
48 x 72	1200 x 1800	.001	0.0254	6	150	2280	1034	85161
48 x 96	1200 x 2400	.0015	0.0381	8	200	4060	1842	85179
Grade AA—Laboratory—Two Ledge								
12 x 18	300 x 450	.00005	0.0012	4	100	87	39	85011
18 x 24	450 x 600	.000065	0.0016	4	100	180	82	85029
24 x 36	600 x 900	.000085	0.0021	6	150	478	217	85056
30 x 48	750 x 1200	.00015	0.0038	6	150	910	413	85083
36 x 48	900 x 1200	.00015	0.0038	6	150	1100	499	85111
36 x 72	900 x 1800	.00025	0.0063	10	250	2695	1222	85129
48 x 72	1200 x 1800	.0003	0.0076	8	200	2915	1322	85156
48 x 96	1200 x 2400	.0004	0.0101	12	300	5830	2644	85174
Grade A—Inspection—Two Ledge								
12 x 18	300 x 450	.0001	0.0025	4	100	87	39	85014
18 x 24	450 x 600	.00013	0.0033	4	100	180	82	85032
24 x 36	600 x 900	.00017	0.0043	4	100	365	166	85059
30 x 48	750 x 1200	.0003	0.0076	6	150	910	413	85086
36 x 48	900 x 1200	.0003	0.0076	6	150	1100	499	85114
36 x 72	900 x 1800	.0005	0.0125	8	200	2155	978	85132
48 x 72	1200 x 1800	.0006	0.0152	8	200	2915	1322	85159
48 x 96	1200 x 2400	.0008	0.0203	10	250	4860	2204	85177
Grade B—Toolroom—Two Ledge								
12 x 18	300 x 450	.0002	0.0050	3	75	64	29	85017
18 x 24	450 x 600	.00026	0.0066	3	75	133	60	85035
24 x 36	600 x 900	.00034	0.0086	4	100	365	166	85062
30 x 48	750 x 1200	.0005	0.0125	4	100	620	281	85089
36 x 48	900 x 1200	.0005	0.0125	4	100	740	336	85117
36 x 72	900 x 1800	.001	0.0254	6	150	1645	746	85135
48 x 72	1200 x 1800	.001	0.0254	6	150	2220	1007	85162
48 x 96	1200 x 2400	.0015	0.0381	8	200	3895	1767	85180

Surface Plate Stands
Stationary and Rolling


Supports Twice the Weight of the Plate
Unique Bolt-Type Assembly (No Welding)
Long-Wearing Baked Enamel Finish
Leveling Screws or Casters

Steel stand for surface plates 24" x 36" and smaller

Steel stand for surface plates 30" x 48" and larger

These handsome new stands are the strongest, most durable surface plate supports available today. They are structurally engineered to support twice the weight of the plate with ample safety factor—yet are shipped knocked down for easy on-site assembly with carriage bolts (included) and a single wrench. They can also be quickly taken apart for removal to another location, for storage, or for replacement of a member damaged in use. Both types of stands keep the surface plate at a comfortable 34" (864 mm) working height. They have a long-wearing baked enamel finish and are provided with leveling screws for stationary use or with locking casters for rolling from one location to another. Order by surface plate size and thickness. Sent with leveling screws unless otherwise ordered.

Surface Plate Size		Stationary Stand			Rolling Stand		
		Weight		EDP Number	Weight		EDP Number
In.	mm	Lb.	kg		Lb.	kg	
18 x 24	450 x 600	70	32	82000	75	34	82001
24 x 24	600 x 600	80	36	82004	85	39	82005
24 x 36	600 x 900	100	45	82006	110	50	82007
30 x 48	750 x 1200	110	46	82012	119	54	82013
36 x 36	900 x 900	130	59	82016	135	61	82017
36 x 48	900 x 1200	116	53	82018	127	58	82019
36 x 60	900 x 1500	124	56	82020	153	69	82021
36 x 72	900 x 1800	175	79	82022	200	91	82023
48 x 72	1200 x 1800	200	91	82028	310	141	82029
48 x 96	1200 x 2400	220	100	82032	400	181	82033
60 x 120	1500 x 3000	650	295	82040	*	*	—
72 x 96	1800 x 2400	490	222	82042	550	249	82043
72 x 144	1800 x 3600	800	363	82045	*	*	—

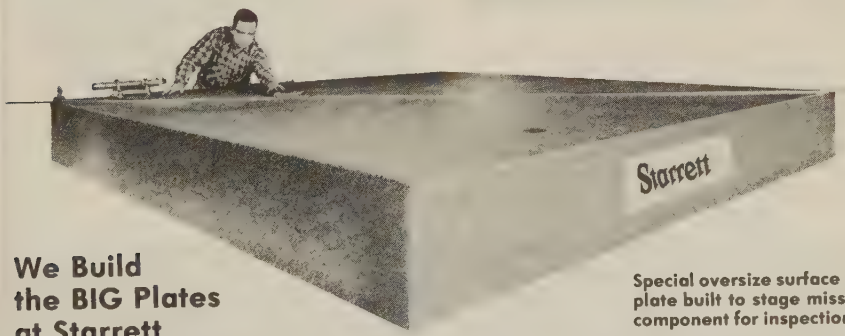
Note: Sizes other than listed above available to order.

*Rolling stands not recommended for surface plates of this size.

Surface Plate Stands—Cabinet Type

Cabinet stands provide a strong, rigid support for standard size surface plates listed below—plus a handy place to store frequently used inspection tools and accessories. Standard height: 36" (900 mm) from floor to top of surface plate. All stands provided with doors on front. Those 48" (1200 mm) wide also have doors on the back. Made of heavy gauge welded steel. Supplied with door locks and leveling screws. Also available with casters (specify). Order by surface plate size and thickness.

Surface Plate Size		Stand Weight		with Leveling Screws	with Casters
In.	mm	Lb.	kg	EDP No.	EDP No.
24 x 36	600 x 900	190	86	81504	81506
30 x 48	750 x 1200	265	120	81510	81512
36 x 36	900 x 900	245	111	81516	81518
36 x 48	900 x 1200	300	136	81513	81515
36 x 60	900 x 1500	365	166	81519	81521
36 x 72	900 x 1800	440	200	81522	81524
48 x 72	1200 x 1800	660	299	81525	81527



Special oversize surface plate built to stage missile component for inspection

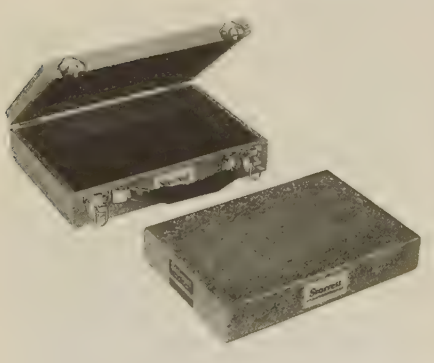
We Build the BIG Plates at Starrett

At Starrett we specialize in designing and building granite surface plates for inspecting and testing huge, oversize parts and assemblies—like Diesel engine blocks and crankshafts, vehicle frames, missile components and ground support equipment. There's virtually no limit on plate length, width and thickness—if you can handle it on site, we can make it. One plate, for example, measured 5' x 45' and weighed 58 tons!

Starrett oversize surface plates are made from single, solid slabs of granite *quarried in one piece, machined in one piece and finished lapped in one piece to specified flatness tolerance.* No more nuisance and time wasted lining up a group of smaller plates to create one large reference surface. And you get the fine finish and remarkable surface wear life of a true quartz-bearing granite.

Inquiries for granite surface plates to accommodate "elephant size" parts and assemblies should indicate (1) type of part to be staged, (2) distribution of weight and mass, (3) degree of inspection accuracy required, (4) work-holding requirements and (5) plant area in which plate is to be installed—including footing requirements, ceiling height and availability of heavy duty work-handling and transporting equipment.

Toolmakers' Flat



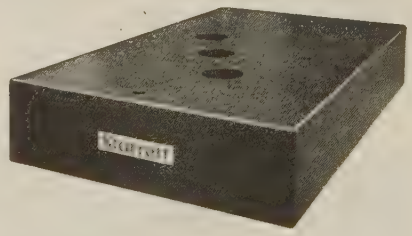
This handy toolmakers' flat is a small precision surface plate that finds many inspection and checking uses in the plant. It is particularly well suited for layout work and supplies an easily portable reference for gaging small parts. Made of MASTER PINK, CRYSTAL PINK or Black Granite 12" long x 8" wide x 2" thick (300 mm x 200 mm x 50 mm) finished to an overall tolerance of .0001" (0.0025 mm). It may be purchased if desired with an attractive, protective carrying case at extra cost. Shipping weight without case is 20 lb. (9 kg).

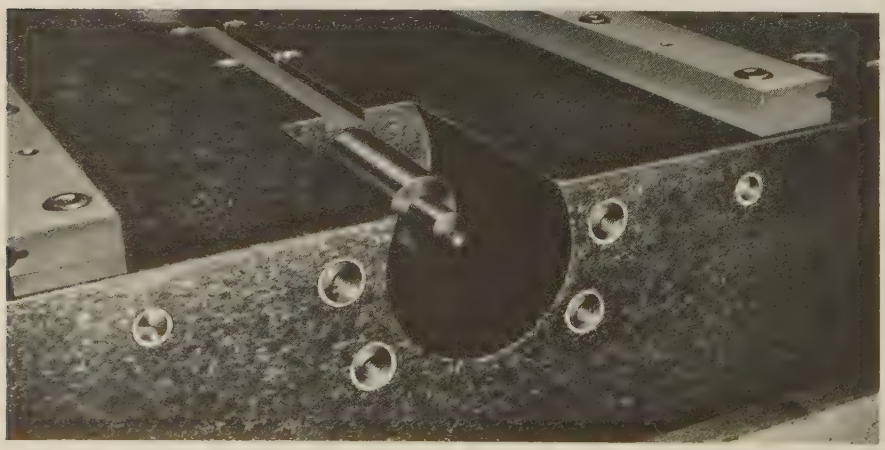
Type	EDP No.
MASTER PINK	81801
CRYSTAL PINK	81803
Black	81802

Sturdy felt lined case for above EDP No. 81804

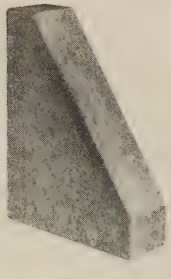
Surface Plates as Fixture Bases

Standard or special surface plates can be modified in many ways for work holding or attaching special gaging equipment. Threaded inserts, studs, adapter holes, T-slots, dovetails—almost anything added to conventional gaging fixtures can also be added to Starrett Granite Surface Plates, extending their accuracy and versatility into many new areas of manufacturing. Precision edges, made square with the top surface and adjacent edges, as well as precision graduated rules can be added, too. The uses of Starrett Granite Surface Plates are limited only by the imagination of the creative tool designer. Inquiries for special surface plates of this type will be studied and recommendations made without obligation.





Surface Plate Accessories



Three Face Tri-Squares

Three Face Granite Tri-Squares are an excellent, economical way of accurately checking the XYZ axes on N.C. machine tools and coordinate measuring machines.

Lying in the horizontal position, with an indicator in the spindle, the X and Y axes can be checked for 90 degree squareness. With the square in the vertical position, the Z axis perpendicularity can be checked by tracing along the vertical edge of the square.

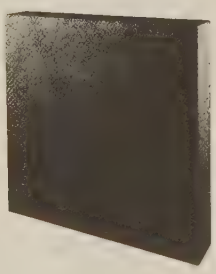
Granite Tri-Squares may also be used in the same manner as steel squares would be used for direct checking of squareness and straightness.

MASTER PINK®

Dimensions						Weight		Grade—EDP Number	
In.			mm					AA	A
Base	Height	Thickness	Base	Height	Thickness	Lb.	kg	.000025"/6" TIR	.00005"/6" TIR
9	12	3	225	300	75	23	10	81961	81962
12	18	4	300	450	100	60	27	81964	81965
18	24	4	450	600	100	120	54	81967	81968

Other sizes quoted on application.

Five Face Master Squares



Five Face Master Squares have become very popular for accurately checking the XYZ axes on N.C. machine tools and coordinate measuring machines.

Lying in the horizontal position with an indicator in the spindle, the X and Y axes can be checked for 90 degree squareness. With the square in the vertical position, the Z axis perpendicularity can be checked by tracing along the vertical edge. By tracing along the top edge of the square, while in the vertical position, it will check parallelism of the table in X and Y axes to the spindle.

The five face master squares may also be used on any work that requires a check on squareness or parallelism.

MASTER PINK®

Dimensions						Weight		Grade—EDP Number	
In.			mm					AA	A
Length	Width	Thickness	Length	Width	Thickness	Lb.	kg	.000025"/6" TIR	.00005"/6" TIR
12	12	3	300	300	75	41	19	81919	81920
14	14	3	350	350	75	56	25	81922	81923
16	16	4	400	400	100	98	44	81925	81926
24	24	4	600	600	100	220	100	81931	81933

Other sizes quoted on application.

Although black granite 5-face squares and 3-face tri-squares can be quoted on request, because of the superior wear qualities of master pink, black is not recommended.

Surface Plate Accessories

Straight Edges

(ONLY ONE EDGE FINISHED)

These straight edges are highly useful for checking straightness and flatness. Plastic coated metal handles are available for all sizes. Furnished without handles unless otherwise specified. Cases available at additional cost.

MASTER PINK®

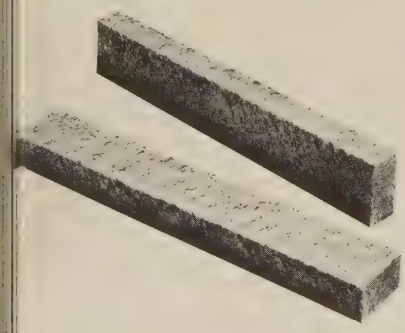
Length x Thickness x Height		Unilateral Tolerance (TIR)		Weight		EDP No.	Case Only
In.	mm	In.	mm	Lb.	kg		EDP No.
24 x 2 x 4	600 x 50 x 100	.000050	0.0012	18	8	81608	81615
30 x 2 x 5	750 x 50 x 125	.0001	0.0025	28	13	81609	81616
36 x 2 x 6	900 x 50 x 150	.0001	0.0025	41	19	81610	81617
42 x 2 x 7	1050 x 50 x 175	.0001	0.0025	56	26	81611	81618
48 x 3 x 8	1200 x 75 x 200	.0001	0.0025	110	50	81612	81619
60 x 3 x 10	1500 x 75 x 250	.00015	0.0038	172	78	81613	81620
72 x 3 x 12	1800 x 75 x 300	.0002	0.0050	247	112	81614	81621

BLACK GRANITE

Length x Thickness x Height		Unilateral Tolerance (TIR)		Weight		EDP No.	Case Only
In.	mm	In.	mm	Lb.	kg		EDP No.
24 x 2 x 4	600 x 50 x 100	.000050	0.0012	20	9	81601	81615
30 x 2 x 5	750 x 50 x 125	.0001	0.0025	31	14	81602	81616
36 x 2 x 6	900 x 50 x 150	.0001	0.0025	45	21	81603	81617
42 x 2 x 7	1050 x 50 x 175	.0001	0.0025	61	28	81604	81618
48 x 3 x 8	1200 x 75 x 200	.0001	0.0025	120	55	81605	81619
60 x 3 x 10	1500 x 75 x 250	.00015	0.0038	188	85	81606	81620
72 x 3 x 12	1800 x 75 x 300	.0002	0.0050	270	123	81607	81621

Surface Plate Accessories—Cont.

Parallels



Produced in four sizes, Starrett MASTER PINK Granite and Black Granite Parallels are useful in setting up work on surface plates and machine tables. Available in matched pairs finished on two opposite faces or all four faces. Storage cases are available at slight extra cost.

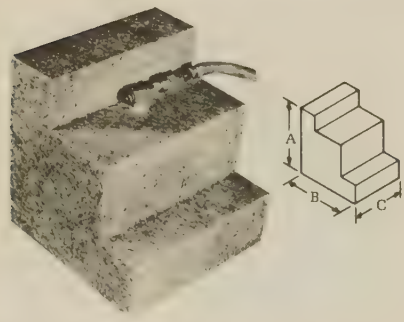
MASTER PINK®

Length x Thickness x Width		LABORATORY				INSPECTION				CASE ONLY	Weight Per Pair	
		Unilateral Tolerance TIR		2-Face	4-Face	Unilateral Tolerance TIR		2-Face	4-Face			
In.	mm	In.	mm	EDP No.	EDP No.	In.	mm	EDP No.	EDP No.	EDP No.	Lb.	kg
6x ¾x1	150x19x 25	.000030	0.0008	81691	81692	.000050	0.0012	81693	81694	81707	1	.45
12x1 x2	300x25x 50	.000050	0.0012	81695	81696	.0001	0.0025	81697	81698	81708	4	2
18x1½x3	450x37x 75	.0001	0.0025	81699	81700	.0002	0.0050	81701	81702	81709	16	7
24x2 x4	600x50x100	.00015	0.0038	81703	81704	.0003	0.0076	81705	81706	81710	36	16

BLACK GRANITE

Length x Thickness x Width		LABORATORY				INSPECTION				CASE ONLY	Weight Per Pair	
		Unilateral Tolerance TIR		2-Face	4-Face	Unilateral Tolerance TIR		2-Face	4-Face			
In.	mm	In.	mm	EDP No.	EDP No.	In.	mm	EDP No.	EDP No.	EDP No.	Lb.	kg
6x ¾x1	150x19x 25	.000030	0.0008	81675	81676	.000050	0.0012	81677	81678	81707	1	.45
12x1 x2	300x25x 50	.000050	0.0012	81679	81680	.0001	0.0025	81681	81682	81708	5	2
18x1½x3	450x37x 75	.0001	0.0025	81683	81684	.0002	0.0050	81685	81686	81709	18	8
24x2 x4	600x50x100	.00015	0.0038	81687	81688	.0003	0.0076	81689	81690	81710	40	18

Surface Plate Accessories—Cont.

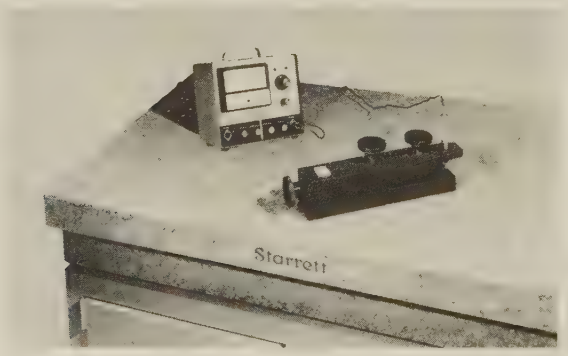


Right Angle Blocks

Starrett Right Angle Blocks are made of MASTER PINK granite. They are available as 2-faced blocks with base and 90° face finished, or as 4-faced blocks with base, 90° face and ends finished to an accuracy of .000025" per 6" of height (0.0006 mm per 150 mm). Also available with "Air Lift" which allows the inspector to guide the angle blocks into position at the touch of a finger. By riding on a cushion of shop compressed air (at a supply pressure as low as 2½ to 5 psi), the bottom face escapes friction and wear, helping preserve the angular accuracy of the block.

Dimensions						Weight		Without Air Lift		With Air Lift	
In.			mm					2-Face	4-Face	2-Face	4-Face
A	B	C	A	B	C	Lb.	kg	EDP No.	EDP No.	EDP No.	EDP No.
6	6	6	150	150	150	15	7	81546	81547	—	—
9	9	9	225	225	225	45	21	81550	81551	81552	81553
12	12	12	300	300	300	120	55	81554	81555	81556	81557
18	18	18	450	450	450	357	162	81558	81559	81560	81561

Repeat Reading Gage



This high precision instrument provides a rapid check of surface plate repeatability with readings taken on its high magnification Last Word Electronic Amplifier. The base has a vernier adjustment knob for zero setting the cartridge type gaging head, and all contact points resting on the granite including the contact point the gaging cartridge touches are tungsten carbide, lapped to a fine finish. A spring steel leaf connecting the floating base (holding the gaging head) to the main base, assures long life and unrestricted flexibility. The instrument is used with Starrett No. 812 Last Word Electronic Gage with No. 812-2 Cartridge Type Gaging Head. 1½" contact required. It also accommodates comparator type indicators with .375" (9.5 mm) diameter stems. 1" contact required.

Gage Only in Carrying Case (Without Electronic Gage). EDP No. 81815

Surface Plate Covers

These covers fit snugly over the top of standard size Starrett Surface Plates, protecting their precise flatness and micro-finish from abrasive dust. Such dust can accelerate wear on a surface plate and the base of gages used on it. Made of a strong vinyl material with a soft cloth lining, the covers are recommended whenever surface plates are not in use. In ordering, specify surface plate length and width.

For Surface Size		EDP Number
In.	mm	
12 x 18	300 x 450	83002
18 x 18	450 x 450	83003
18 x 24	450 x 600	83004
24 x 24	600 x 600	83005
24 x 36	600 x 900	83006
30 x 48	750 x 1200	83007

For Surface Size		EDP Number
In.	mm	
36 x 36	900 x 900	83009
36 x 48	900 x 1200	83008
36 x 60	900 x 1500	83012
36 x 72	900 x 1800	83013
48 x 72	1200 x 1800	83010
48 x 96	1200 x 2400	83011

Surface Plate Cleaner

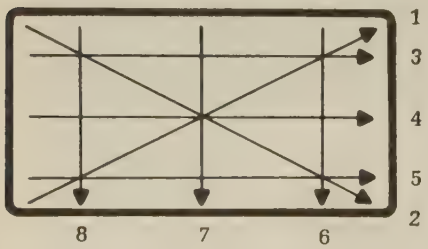
To keep surface plates and other precision granite products in top condition, they should be wiped off frequently with Starrett Cleaner. This helps prevent abrasion of tools by dirt and other foreign particles. The cleaner, which also acts as a degreaser and rust inhibitor, should be used **without** water to minimize risk of rusting tools. Supplied in 55 gallon drums; 5 gallon containers with pouring spout; 1 gallon plastic containers (packed four in a carton); 1 pint plastic bottles (packed 12 in a carton).

Quantity	EDP Number
55 gallon Drum	81820
5 gallon Container	81821
gallons (case of 4)	81822

Quantity	EDP Number
1 gallon	81823
plastic pints (case of 12)	81824
plastic pint (one)	81825

Relapping Services

Starrett relapping service is available for all types and makes of granite surface plates. When certification of surface tolerance is required, recalibration service with an auto-collimator will be provided with accuracy traceable to the National Bureau of Standards.

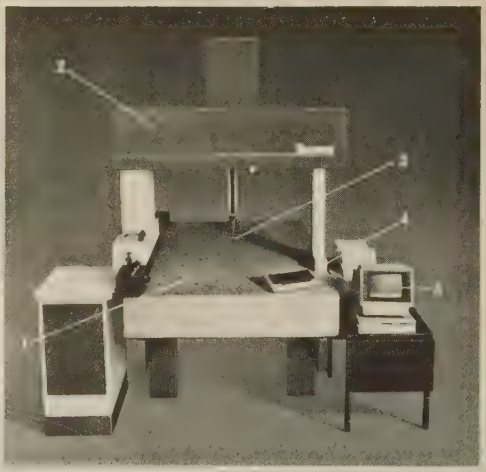


Plates to be resurfaced can be shipped to the Starrett Granite Surface Plate Division, 1372 Boggs Drive, Mount Airy, North Carolina 27030. Relapping can also be done in your plant, saving crating and shipping costs as well as inspection equipment down time. Charges are made on a square foot basis with an additional travel charge. For a quotation on the cost of a visit to your plant by the Starrett Mobile Lapping Unit, send us a list of plates, their sizes and flatness tolerance required.

Starrett®

Coordinate Measuring Machines

What Is A Coordinate Measuring Machine?



A Starrett Coordinate Measuring Machine is a system of elements used as a "tool" in the measuring of 3-dimensional parts. This system consists of 4 elements:

A. The measuring element (or the "machine" itself)
B. The probes
C. The computer and software
D. Any accessories needed to customize the system.

Each measurement machine has a probe bar into which you fit a wide variety of probes. This probe bar allows you to move the probe within a cubic measuring area.

The measuring cube is defined by an X, a Y and a Z axis. When you contact the probe to a part, that point is defined by its relation to the axis. Reader heads traveling on each axis transmit the point location information to the communications interface. With multiple point information and software programming, the computer can calculate accurate dimensional and geometric information about your part.

Most amazing about Coordinate Measuring Machines is the ease and speed with which you get part data. This system has replaced many time-consuming and error-prone steps that are required to get the same data manually. Coordinate Measuring Machines can dramatically reduce the inspection time now lost by the use of multiple set-ups.

The value of a Coordinate Measuring Machine begins to grow when you look at the number of its applications. Coordinate Measuring Machines can be used in the inspection of machined workpieces, forgings, stampings and castings. They can be used for first-part, in-process, one-of-a-kind, receiving and final inspection.

Accuracy, repeatability, ease of operation, speed —nothing makes more sense than a Starrett Coordinate Measuring Machine in quality control.

Components

1. Surface Plate
Starrett Crystal Pink granite surface plates have the most crystalline quartz of any granite plate for higher resistance to wear. Maintains flatness accuracy and outlasts other plates as much as 5 to 1. More rigidity, vibration isolation and temperature stability than steel.

2. Bridge Design
Greater rigidity and stability over a wide range of sizes, permits access to all sides of a part.

3. Probes
We offer a complete range of hard probes and electronic probes to suit your needs. (see pages 426, 427)

4. Bearings
The outboard leg utilizes an air bearing. The main support and carriage utilizes mechanical bearings. This combination provides ease of movement. No "settling" time required.

5. Computer
Full range of computation systems available. Hewlett-Packard hardware. Three dimensional software add up to a complete approach. (see pages 424, 425)

6. Communications Interface (not illustrated)
3 axis, 100–240 VAC, 47/63 Hz, 1 phase digital axis transceiver for domestic or international use.

Why A Starrett Rapid Check?

For over 100 years, Starrett has been known as "World's Greatest Toolmakers" where over 3,000 precision tools have always been manufactured to the highest standards of quality. It is therefore, only natural that you would expect Starrett to make only the finest Coordinate Measuring Machine.

Compare Starrett Coordinate Measuring Machines with any competition. We match or surpass the competition on capabilities, accuracy, speed and repeatability, but we stand head and shoulders above the crowd on flexibility and reliability.

Why purchase more machine than you need when we offer you a wide variety of equipment sizes.

We have built a quality product requiring less service. You will never get to know our service people well.

An integral part of any Coordinate Measuring Machine process is the computer capability. You need it to provide accurate data . . . fast.

Our computers and software pack a lot of power in a very small package. But, power is not all you need. You need logic paths and data in a simple and usable format.

Check out our unique and proprietary software line. It is developed by and for inspection people.

Certification Of Accuracy

All RAPID CHECK CMM's are tested prior to shipment in accordance with the NMTBA Definition and Evaluation of Accuracy and Repeatability for Numerically Controlled Machine Tools, 2nd Edition, and to Starrett Coordinate Measuring Machine Division specifications.

All equipment used (calibration rails, plates, laser, master squares and blocks) are traceable to the U.S. National Bureau of Standards. Test data for each machine is kept on file at Starrett Coordinate Measuring Machine Division.

Repeatability

The Rapid Check is also tested to assure the high level of repeatability necessary for continuous accurate inspection.

Repeatability: Repeatability tolerances are as shown on page 423 under Specifications. Repeatability is the difference in value from a zero setting when you return to that setting a number of times under the same conditions.

Tests are conducted in ambient temperature of 68 degrees F ± 1 degree F (20° Celsius) after a minimum soaking time of 12 hours in constant temperature.

Resolution

The Starrett Rapid Check has a resolution of .0001 inch (.002 mm).

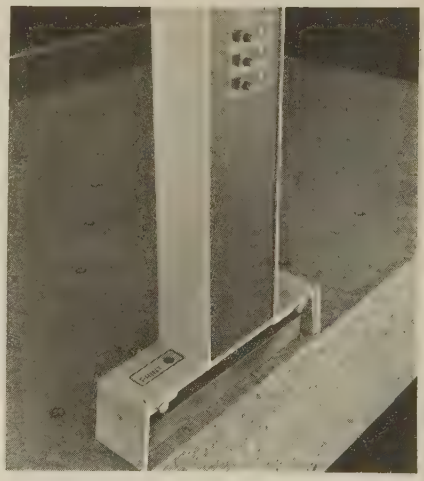
Linear Accuracy

The total error must not exceed the quantities shown in the column under linear accuracy for the given size of the CMM. Accuracy for machines is as shown on page 423 under specifications.

Flexibility And Versatility

The Starrett Rapid Check now allows you to choose the right system every time. Build a customized system from our choice of computers, probes and accessories. And, as your needs change, the modular design of your Rapid Check will allow your CMM capabilities to change and grow too!

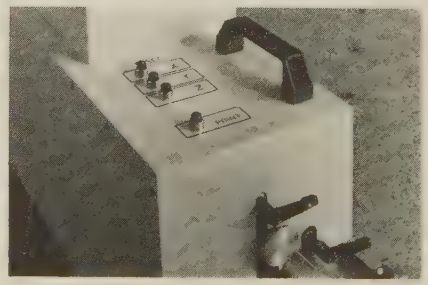
RCS Series Systems Basic Machine Specifications



The bridge design of RAPID CHECK allows for a wide range of standard sizes, as well as the ability to offer special combination sizes economically (consult Starrett Coordinate Measuring Machine Division).

All standard models include:

- Starrett Crystal Pink Surface Plate and stand, Laboratory Grade (see page 423 for tolerance)
- Vibration Absorbing/Levelling Mounts
- Electronic Communications Interface
  — RS232C Communications port
  — Integrated circuits
  — Modular design
- Remote "zero-reset" buttons on the inboard and outboard legs for operator convenience
- Locks on X axis, Y axis and Z axis
- Adjustable air counterbalance on Z axis with air failure safety device
- Fine adjustment on X axis and Y axis
- Air bearing on outboard leg
- Air dryer/filtration unit
- Threaded inserts in surface plate for part clamping
- Three cone points inserted in granite base of every machine for purpose of verifying calibration
- Set-up, calibration, and training in United States and Canada by a Starrett Service Engineer. The surface plate and stand must be set-up and levelled. Required air and electricity provided by the customer in its permanent location prior to the visit of the Starrett Service Engineer.



All models are available with optional Z axis fine adjustment feature. (Field retrofit available.)

RCS Series Specifications

Catalog No.	EDP No.	Measuring Capacity, Inches			Overall Size, Inches			Gross Wt., lbs.	Net Wt., lbs.	Linear Accuracy		Repeatability	
		X	Y	Z	L	W	H			± inch	mm	± inch	mm
RCS2828-18	38000	28	28	18	54	37½	92	2600	2400	.0002	.005	.0002	.005
RCS2828-24	38001	28	28	24	54	37½	104	2700	2500	.0003	.007	.0002	.005
RCS4028-18	38002	40	28	18	66	37½	92	3500	3300	.0003	.007	.0002	.005
RCS4028-24	38003	40	28	24	66	37½	104	3600	3400	.0004	.010	.0002	.005
RCS4040-18	38005	40	40	18	66	49½	92	4400	4200	.0004	.010	.0002	.005
RCS4040-24	38006	40	40	24	66	49½	104	4500	4300	.0004	.010	.0002	.005
RCS4040-32	38007	40	40	32	77	50½	122	5500	5300	.0006	.015	.0003	.007
RCS5240-18	38008	52	40	18	78	49½	92	5500	5300	.0005	.012	.0002	.005
RCS5240-24	38009	52	40	24	78	49½	104	5600	5400	.0005	.012	.0003	.007
RCS5240-32	38010	52	40	32	89	50½	122	7200	6900	.0006	.015	.0004	.010
RCS6440-18	38011	64	40	18	90	49½	92	7600	7300	.0005	.012	.0002	.005
RCS6440-24	38012	64	40	24	90	49½	104	7700	7400	.0005	.012	.0003	.007
RCS6440-32	38013	64	40	32	101	50½	122	8800	8500	.0006	.015	.0004	.010
RCS6448-18	38014	64	48	18	90	57½	92	8000	7700	.0006	.015	.0003	.007
RCS6448-24	38015	64	48	24	90	57½	104	8100	7800	.0006	.015	.0003	.007
RCS6448-32	38016	64	48	32	101	58½	122	9300	9000	.0007	.017	.0004	.010
RCS7640-18	38017	76	40	18	102	49½	92	8700	8400	.0007	.017	.0003	.007
RCS7640-24	38018	76	40	24	102	49½	104	8800	8500	.0007	.017	.0004	.010
RCS7640-32	38019	76	40	32	113	50½	122	9700	9400	.0008	.020	.0004	.010
RCS7648-18	38020	76	48	18	102	57½	92	9200	8900	.0008	.020	.0003	.007
RCS7648-24	38021	76	48	24	102	57½	104	9300	9000	.0008	.020	.0004	.010
RCS7648-32	38022	76	48	32	113	58½	122	11,700	11,400	.0008	.020	.0004	.010

Resolution
.0001 inch (.002 mm)

Power Requirements
115 VAC or 230 VAC, 50/60 Hertz, Single Phase.

Air Requirements
¼" airline, 70 psi to air dryer unit supplied. RAPID CHECK uses only 1 CFM.

Weight Capacity
Is twice the net weight listed for each machine.

ie. RCS2828-18
Net Wt. 2400 lbs
Weight Capacity 4800 lbs

Tolerance
Crystal Pink's unilateral flatness tolerance meets or exceeds Federal Specification GGG-P-463c. Laboratory Grade

Computers & Software

Starrett Rapid Check systems offer powerful Hewlett-Packard desktop computers and unique software to suit your needs.

System CA-1610: using the HP9816S computer, has added memory capacity to 3/4 Mbytes, 9" CRT, detachable standard keyboard and a separate 8-1/2" X 11" printer with graphics capabilities. It has built in RS232C interface capabilities, built in HPIB interface and an external mass storage device with 1,260 Kbytes capacity.

Software includes AUTOMATIC TOLERANCE INSPECTION (ATI) as well as standard MANUAL inspection routines. This unit offers the additional capability to AUTOMATICALLY collect variables and run the PROCESS ANALYSIS (CA-200) software package. (See page 425 for details on PROCESS ANALYSIS.)

Tie it all together, a quality Coordinate Measuring Machine, an easy to operate computer program, comprehensive back-up and you see why Starrett is your source for total quality control.

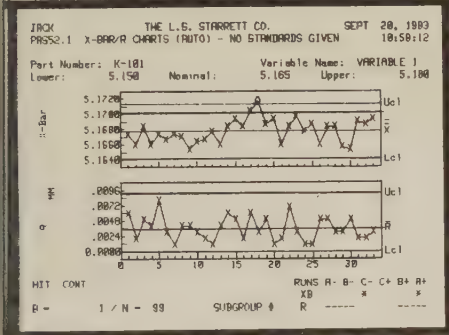
SYSTEM CA-1610

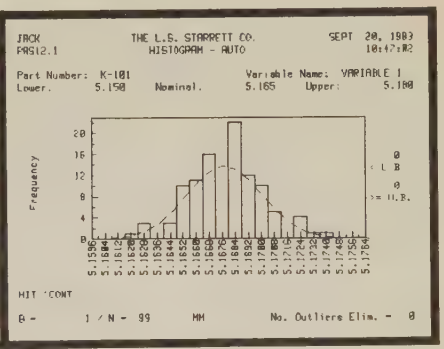
Specifications

Catalog Number	EDP Number	Model & Description
		Systems
CA-1610	38108	9816S Based 3D measurement computation package for manual system using Communication Interface electronics package.
CSA-1611	38109	Extra PROGRAM disc
CSA-1612	38110	Extra EDIT and UTILITIES disc
CSA-1613	38111	Extra DATA disc
#2009-6	38112	Extra Operating and Instruction Manual
CA-200	38099	Process Analysis Software
CSA-8510	38076	Extra Program Tapes for CA-8510
#2009-2	38077	Extra Software Manual for CA-8510

THINK JET PRINTER

Statistical Quality Control





Process Analysis Program CA-200 (EDP 38099)

Statistics are the results from collecting data. Properly used, this information will allow the user to accurately predict results.

Terms most used when applying statistics to quality control are:

Population: The whole group or total

Observation: a single item of the population

Variable: an item with the ability to change, an observation or single item may have numerous variables

Sample Size: the total number of observations selected from the population to collect the variables.

By using this variable data (from each observation in the sample size), we can accurately make estimations and predictions to help determine whether the product is within specifications and also if we are able to continually produce these parts within the same specifications and tolerances.

Within any manufacturing environment, there is a need for the Quality Control Division to have the necessary tools to both collect the data and then evaluate the data for conformance to the requirement.

Statistics can be a very useful tool in the evaluation of the data. Statistics work by applying mathematically proven formulas to the number of observations and variables collected to make confident predictions.

The L. S. Starrett Company has a statistically accurate and complete software package available, the PROCESS ANALYSIS PROGRAM No. CA-200, designed to operate on the same computer hardware which runs the measurement software No. CA-1610.

FEATURES:

- Permanent data storage and complete data management
- Part definition, observation information and automatic or manual data collection are provided for timely analysis
- A variety of updating and reporting capabilities are provided for complete data control

Control chart techniques are used to determine the normal variation in the manufacturing method, to determine process tolerance tendencies, and also to determine a change in the manufacturing method. X-Bar (range) charts, Sigma (standard deviation) charts and histograms (step bar graphs) graphically illustrate both normal variations and highlight any abnormal changes in the process.

The benefits of The L. S. Starrett Company's statistical control package (Process Analysis) are:

- Provides fundamental statistical quality control tools
- Maintains part histories, increasing knowledge of process
- Aids in increasing productivity and quality
- Organizes data
- Determines machines, methods, and process capabilities
- Aids in reducing scrap, rework and repair
- No programming experience required
- Provides means to educate employees in statistical control methods
- Provides graphic illustrations of process tendencies.

Electronic Probes

We offer two basic electronic probe sets. These probes are omni-directional, self-triggering devices consisting of a probe body and stylus. Each type is equipped with a shank adapter, ready to mount in the probe bar of a RAPID CHECK CMM. The use of an electronic probe results in faster and more accurate data gathering by eliminating much of the human "feel" required with hard probes. Each requires a probe qualifier.

Electronic Probe Set No. CA-61 (EDP 38106)

For general measuring applications, complete with electronics, remote control arming/disarming switch and one standard stylus (4 mm diameter ball).
Complete with the following items.

Catalog Number	Description
C-2136	TP1/C Probe
C-2058	HC-1 Arming Control Device
C-667	Probe Adapter Shank
C-2137	SA3 Adapter (allows TP2 styli to be used in TP1)
C-2129	PS17R, 4 mm X 20 mm long Ruby Stylus
C-2116	S7, Tool
C-2050	Probe Qualifier, 1.5 in. dia. Mounted Sphere

Chuck Probe Holder No. CA-30 (EDP 38049)

A precision 3-jaw chuck, 0-3/8" capacity, used for special requirements. Can hold a long drill blank or long gage pin.

Right Angle Probe Adapter No. CA-282 (EDP 38050)

Holds any standard probe in horizontal plane, 4 positions.

Electronic Probe Set No. CA-1100 (EDP 38102)

For greater versatility and speed the CA-1100 includes a C-2134 Head which allows horizontal swivel and vertical tilting of a stylus to achieve best approach angle to a part feature.
The following is a list of standard items included:

Catalog Number	Description
C-2001	TP2, 5-Way Electronic Probe
C-2058	HC-1, Arming Control Device
C-2134	PH-1, Probe Head
C-2116	S7, Tool
C-2117	S8, Spanner
C-2072	S1, Spanner
C-2114	SE-4, 10 mm Extension
C-2115	SE-5, 20 mm Extension
C-2021	PC-29, Mahogany Storage Box
C-667	Probe Adapter
C-2004	PE-1, 50 mm Extension Bar
C-2050	Probe Qualifier, 1.5 in. dia. Mounted Sphere
C-2111	PS2R, 2 mm x 20 mm long Ruby Stylus
C-2113	PS12R, 4 mm x 10 mm long Ruby Stylus
C-2119	PS14R, 6 mm x 10 mm long Ruby Stylus

Optional Accessories for CA-1100

Catalog Number	EDP Number	Description
C-2056	38103	PH8F, Indexable Probe Head
C-2002	38071	PH6, Simple Probe Head
C-2005	38104	PE2, 100 mm Extension Bar
C-2006	38070	PE3, 200 mm Extension Bar
C-2135	38105	SE6, 30 mm Extension Bar

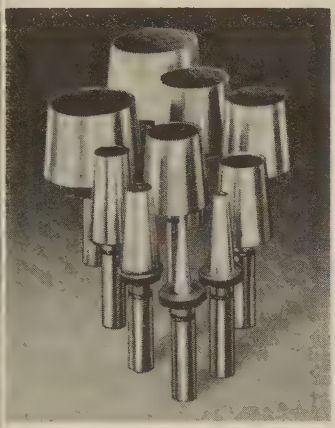
Optional Accessories for CA-1100 & CA-61

Catalog Number	EDP Number	Description
C-2055	38074	Probe Qualifier 2" Dia. Ring Gage

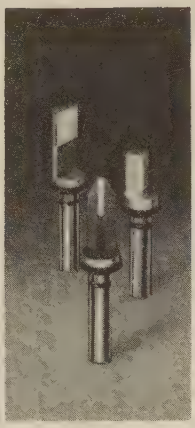
Optional Styli for CA-1100 & CA-61

Catalog Number	EDP Number	Description
C-2122	38069	PS9R, 1 mm x 10 mm long Ruby Stylus
C-2126	38091	PS8R, 2 mm x 10 mm long Ruby Stylus
C-2124	38089	PS1R, 3 mm x 10 mm long Ruby Stylus
C-2128	38093	PS16R, 3 mm x 20 mm long Ruby Stylus
C-2129	38094	PS17R, 4 mm x 20 mm long Ruby Stylus
C-2127	38092	PS13R, 5 mm x 10 mm long Ruby Stylus
C-2120	38067	PS15R, 8 mm x 12 mm long Ruby Stylus
C-2133	38098	PS21R, 18 mm x 11 mm long Hollow Spherical Ball
C-2125	38090	PS7R, 5 Way Stylus, Complete
C-2121	38068	PS3R, 6 mm Spherical Section Stylus
C-2112	38107	PS4R, 18 mm Spherical Section Stylus
C-2118	38065	PS22R, 25 mm Spherical Section Stylus
C-2130	38095	PS18R, 1.5 mm Dia. Cylindrical Stylus
C-2131	38096	PS19R, 3 mm Dia. Cylindrical Stylus
C-2132	38097	PS20R, Pointed Stylus

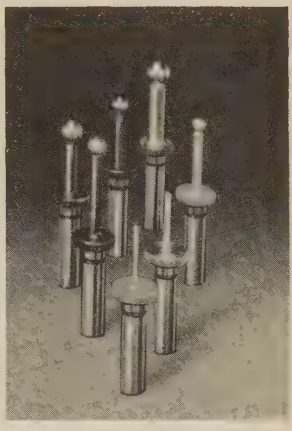
Rapid Check Probe Systems



Conical Probes



Edge Finder Probes



Ball Probes

Conical probes are available in (10) ten standard sizes. Used for inspecting hole positioning. Special conical probes are available upon request.

Edge finder probes are used for part alignment and measurement of flat surfaces or edge of parts. They rotate so that the flat surface of the probe fits against the surface to be measured.

Ball probes are available in a wide selection for checking features of bores, outside surfaces and contours.

Straight Probe No. C-150 has a .200 inch diameter which makes it useful for checking small slots.

Inside Probe No. C-163 is the reverse of a conical probe and is useful for checking stand-offs on sheet metal, bosses, etc.

Layout Probe, Scribe No. 148 has a carbide tip and is used to scribe lines on castings, etc.

Layout Probe, Impact Prick Punch No. CA-5 is spring loaded and automatically makes punch marks when depressed against a surface.

Small Probe Set No. CA-3 comes complete with the following: C-137 Edge Finder, C-138 Conical Probe, C-139 Conical Probe, C-140 Conical Probe, C-161 Ball Probe. Comes complete with birch hardwood box. Box also accommodates additional probes.

Cat. No.	EDP No.	Description
Conical Probes		
C-138	38023	Dia. top .062″, Bottom .375″
C-139	38024	Dia. top .375″, Bottom .687″
C-140	38025	Dia. top .687″, Bottom 1.000″
C-141	38026	Dia. top 1.000″, Bottom 1.250″
C-142	38027	Dia. top 1.250″, Bottom 1.593″
C-143	38028	Dia. top 1.593″, Bottom 1.906″
C-144	38029	Dia. top 1.906″, Bottom 2.218″
C-145	38030	Dia. top 2.218″, Bottom 2.500″
C-146	38031	Dia. top 2.500″, Bottom 2.843″
C-147	38032	Dia. top 2.843″, Bottom 3.000″
Edge Finder Probes		
C-137	38033	Standard 1″ flat edge of center line
C-416	38034	Small edge finder will fit small slots (1/16″ x 3/16″)
C-401	38035	Corner finder used to locate inside corners of cut outs
Ball Probes		
C-1049	38036	Dia. .125″
C-160	38037	Dia. .250″
C-1050	38038	Dia. .375″
C-161	38039	Dia. .500″
C-1051	38040	Dia. .625″
C-162	38041	Dia. .750″
C-1052	38042	Dia. .875″
C-1053	38043	Dia. 1.000″
Layout Probes		
148	38045	Scribe
CA-5	38046	Impact Prick Punch
Small Probe Set		
CA-3	38044	Contains: C-137 Edge Finder C-138 Conical Probe C-139 Conical Probe C-140 Conical Probe C-161 Ball Probe

Rapid Check Miscellaneous Accessories

CALIBRATION PLATE

Centering Microscope
Cat. No. CA-62 EDP No. 38051

Useful for close, non-contact location of features. Furnished with 100X magnification.

Optical Viewing Screen
Cat. No. CA-31 EDP No. 38052

Used for non-contact measuring. Furnished with 10–20X magnification. Viewing screen is 3½″ diameter. The image is optically correct and the workpiece is illuminated.

Check Clamp
Cat. No. CA-1 EDP No. 38053

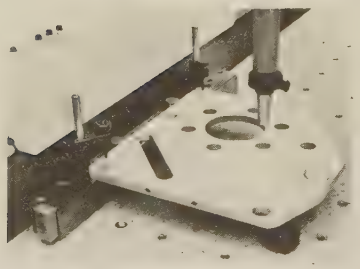
Clamp is a vacuum-based work holding device, will accommodate parts up to 5″ high.

Clamp Set
Cat. No. CA-64 EDP No. 38054

Set consists of step clamps, studs, coupling nuts and flanged nuts for versatile clamping of parts.

Calibration Plate & Probe
Cat. No. CA-23 EDP No. 38063

Meehanite, triangle casting with 5 bushed holes and special ball probe for periodic calibration check. Certification of calibration plate traceable to the National Bureau of Standards.



ALIGNMENT RAIL

Dust Cover
Cat. No. CA-18-2 EDP No. 38059 9 ft. x 12 ft.

Foot Switch
Cat. No. CSA-140 EDP No. 38058

For initiation of data transfer to computer, when not using electronic probe, or in place of using print button on machine.

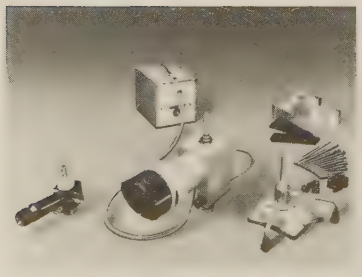
Alignment Rail
Cat. No. CA-235 EDP No. 38056

Rail mounts to surface plate and is aligned with machine axis for fast location of sheet metal parts. 38 inches long for all machines over 28 inches.

Alignment Rail
Cat. No. CA-366 EDP No. 38057

Parallels
Cat. No. CA-2 EDP No. 38055

Parallels facilitate flat parts so that a conical probe can be seated, each parallel is 2 inches high.



ACCESSORIES

Cabinet Stand
Cat. No. CA-367 EDP No. 38061

Probe Box
Cat. No. CA-306 EDP No. 38062

Surface Plate Cleaner
EDP No. 81825 **See page 416**

Standard Reference Bars
Cat. No. RBC25 English
Cat. No. RBCM650 Metric
See page 393

Five Face Master Square, Master Pink
See page 413

Computation Systems Guide

FEATURE	STANDARD ON SYSTEM NO. CA-1610 98165	CAPABILITIES
Surface	●	3rd Axis Alignment (Primary Datum Creation)
Cylinder	●	
Cone	●	
Intersection of Lines	●	Rotation Alignment (Secondary and Tertiary Datum Creation)
Straight Lines	●	
Reset Origin	●	
Single Point	●	Measuring Routines
Straight Line (Straightness)	●	
Circles	●	
Surface	●	
Sphere	●	
Ellipse	●	
Cylinder	●	
Cone	●	
Concentricity	●	
Distance Between Points	●	
Distance Between Lines	●	
Distance Between Surfaces	●	
Between Various Combinations	●	
Intersection of Lines	●	
Parallelism	●	
Perpendicularity Between Lines	●	
Perpendicularity Between Cylinder Surface	●	
Squareness Between Surfaces	●	
Angle Calculations	●	
Flatness	●	
Roundness	●	
Straightness	●	
Automatic Probe Dia. Correction	●	Additional Features
True Position RFC & MMC	●	
Rectangular Polar Selection	●	
Reposition Origin	●	
Save Original Origin	●	
Reposition Primary Datum	●	
Reposition Secondary Datum	●	
Plane Switching	●	
Automatic Tolerance Inspection (ATI)	●	
Process Analysis Link	●	
Printer	●	Data Output Selection
CRT	●	

Rapid Check Computation Systems

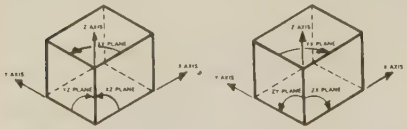
The following pages illustrate only some of the part alignment and measurement routines offered by our unique software. There are over 8000 user-selectable combinations to determine feature locations and geometric shapes.

The CA-1610 package that uses the HP9816S computer offers you an additional benefit; the capability to run process analysis software.

Axis Alignment

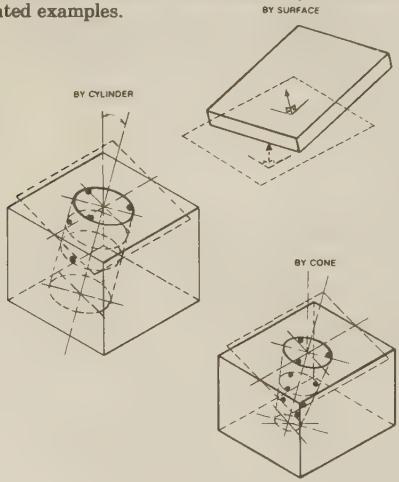
Plane Selection

Plane selection allows the operator to establish the primary datum plan from the workpiece, no need to level the part. Plane switching allows inspection of numerous sides (faces) of the workpiece in one setup, with reference to the original datum required.



3rd Axis

The primary datum is established by the illustrated examples.

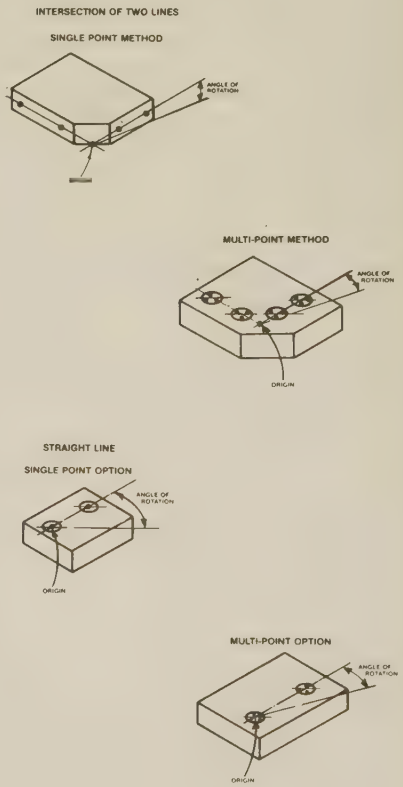


Rotation

Rotation allows the secondary datum to be created by the workpiece. The piece part does not have to be physically rotated parallel to an axis of the measuring machine.

Rotation also can create the measurement origin if desired, or correct the measurements with reference to an origin established by other means.

The secondary datum is established by the illustrated examples.



Rapid Check Computation Systems

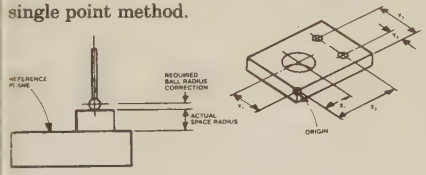
Measuring Routines

Inspection of a workpiece after alignment is dependent on the availability of measuring routines and special functions, which give the operator flexibility and results.

Some of the measurement routines, combinations, and features are shown in the following examples.

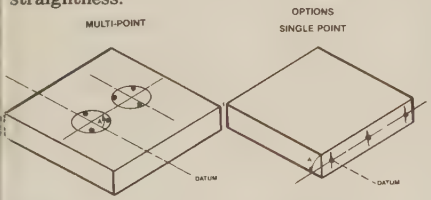
Single Point, including height (space radius)

Single point prints alignment compensated dimensions for measurements obtained by the single point method.

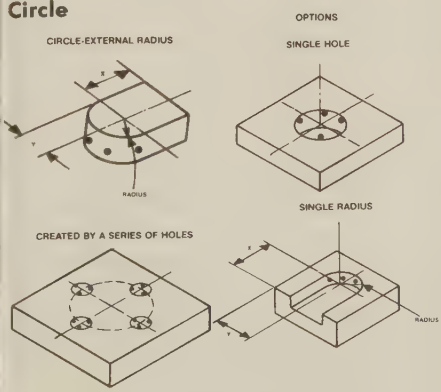


Straight Line

Includes angular relationship to datum line and straightness.

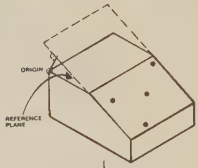


Circle



Surface

Includes angular relationship to reference plane, distance from origin and flatness.

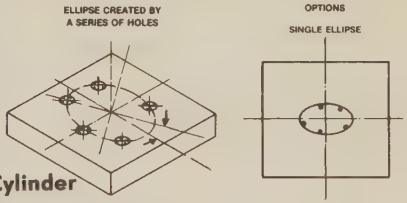


Sphere

Includes center location radius and diameter.

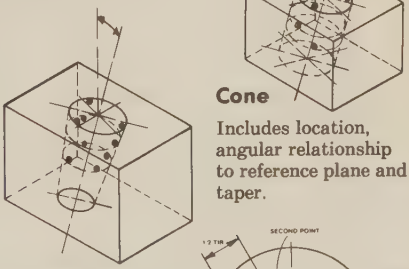
Ellipse

Includes location, max. and min. diameter and rotation in relation to datum.



Cylinder

Includes location, diameter, radius and angular relationship to reference plane.



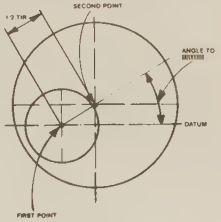
Cone

Includes location, angular relationship to reference plane and taper.

Concentricity

From one of the following:

1. Single Point
2. Circle (center point)
3. Sphere (center point)
4. Ellipse (center point)
5. Cylinder (piercing point)
6. Cone (piercing point)
7. Distance Between Points (midpoint)
8. Point of Intersection

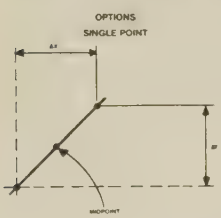


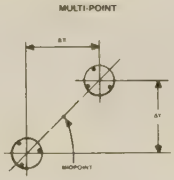
TO:
Circle, includes T.I.R. and angle to datum.

Rapid Check Computation Systems

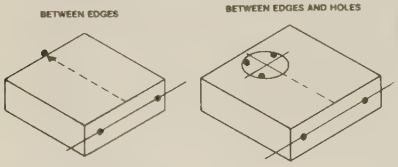
Measuring Routines (cont.)

Distance Between Points





Distance Between Lines



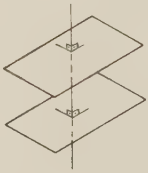
Distance Between

Single Point, Straight Line, Multi Point, Surface, Sphere, Ellipse, Intersection } and { Single Point, Straight Line, Multi Point, Surface, Sphere, Ellipse, Intersection

DISTANCE

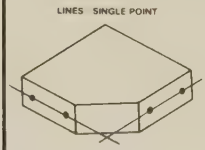
FEATURE 1
BY SURFACE

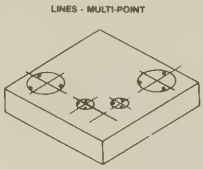
FEATURE 2
BY SURFACE



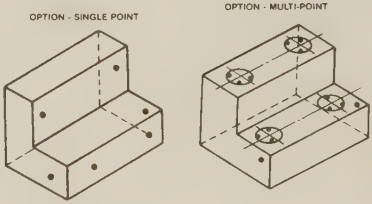
Point of Intersection Between

Surface, Cylinder, Cone } and { Surface, Cylinder, Cone

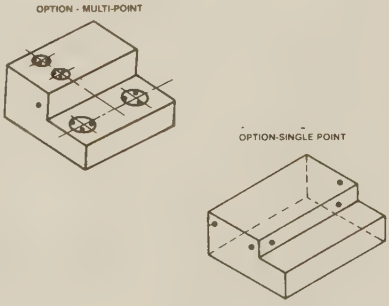




Parallelism



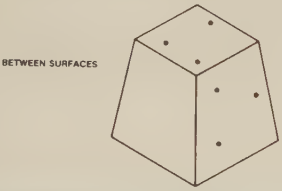
Perpendicularity



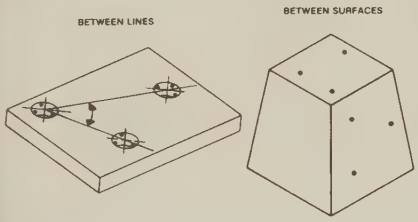
Rapid Check Computation Systems

Measuring Routines (cont.)

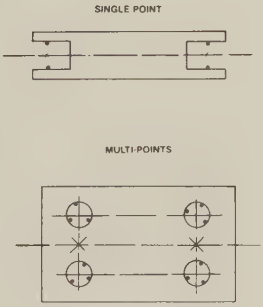
Squareness



Angle Calculation



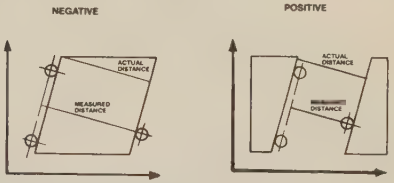
Point of Symmetry



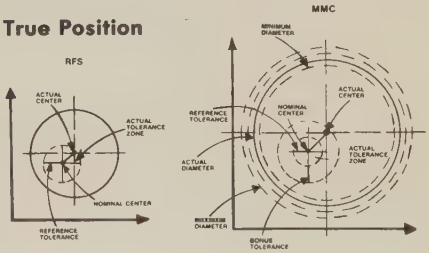
Additional Features

Probe Qualification

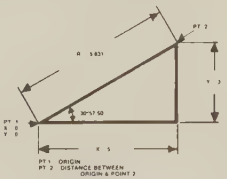
For position and diameter, automatic probe diameter correction.



True Position



Rectangular/Polar Selection



RECT RESULTS
X=5.000
Y=3.000

POLAR RESULTS
A=30°57'50"
R'=5.831

Rapid Check Computation Systems

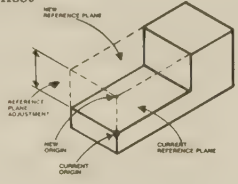
Additional Features

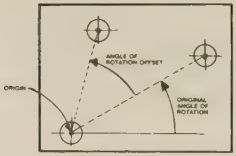
Re-Position

A. Origin
B. Reference Plane
C. Datum Line

New Zero Select Option

1. Manual Entry
2. Last Point
3. Reference Plane Adjustment
4. Rotation Angle Offset





Automatic Tolerance Inspection (ATI)

This routine allows an inspector to program the inspection sequence of a part for subsequent inspection of multiple parts without recalling software routines. There are three modes; LEARN, RUN, and EDIT.

The LEARN mode enables an inspector to teach the computer the programs, modifications, and sequences to inspect a part. The inspector can enter the reference dimensions, the tolerance allowed, and any messages which may be helpful to assist an inspector.

The RUN mode enables an inspector to measure a previously stored part. The computer prompts an inspector by telling him the next step or measurement program to be used, compares the results with the tolerance zone previously entered, and then prints or displays either all dimensions, or only those exceeding their limit.

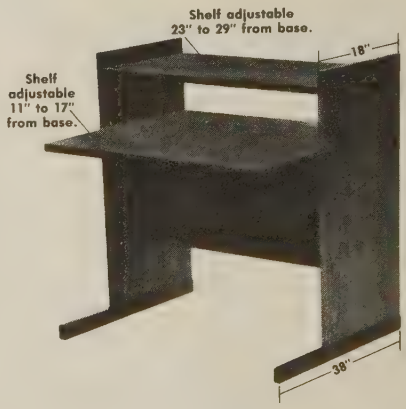
The EDIT mode enables an inspector to change, delete, add to, or list a stored part.

The benefits of Automatic Tolerance Inspection (ATI) are (1) a standardized inspection method, and (2) increased speed of data output.

Computer Stand

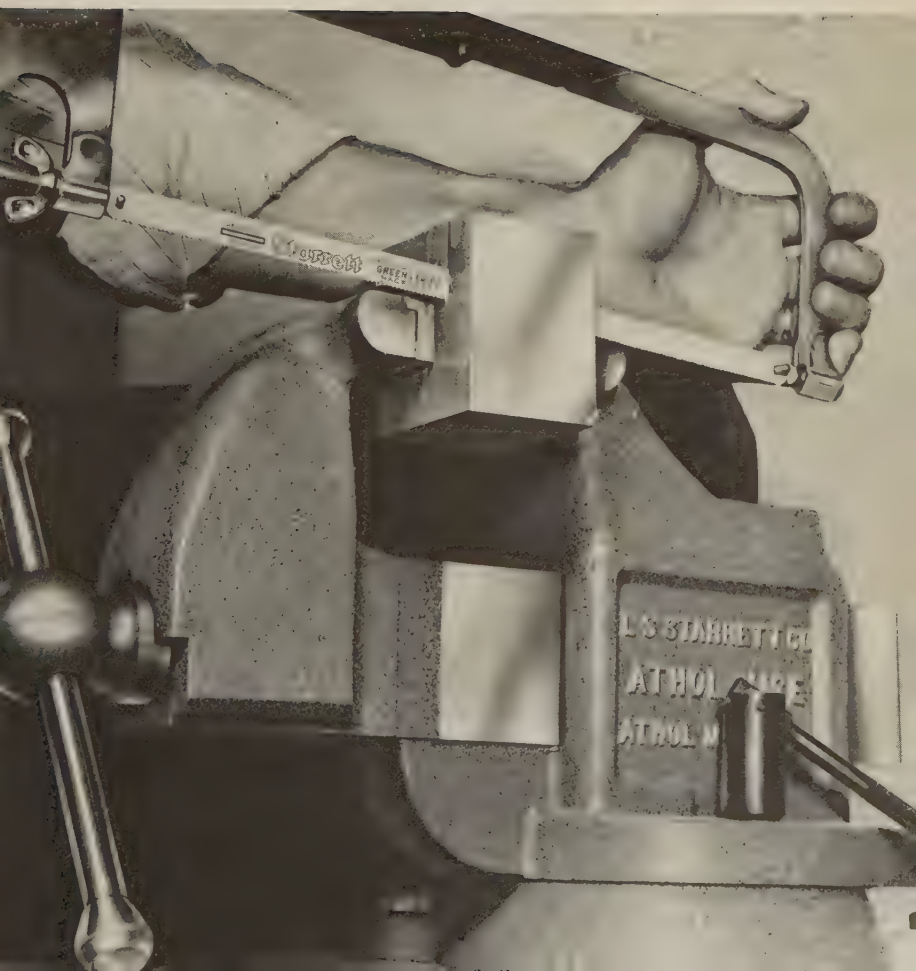
Adjustable split-level computer stand available in 36″ and 48″ widths. Laminated shelf surfaces for long wear. Adjustable shelves within 6″ range. Walnut finish on stand. Includes assembly instructions.

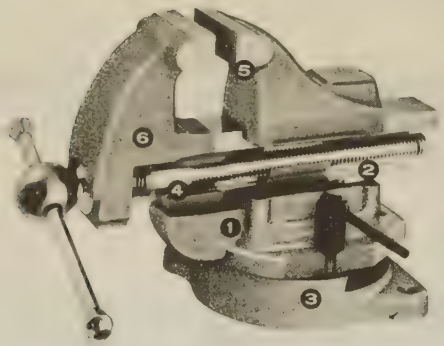
Cat. No.	EDP No.	Width	Monitor Shelf	Keyboard Shelf
CA-368	38113	36″	36″ x 30″ x 1″	36″ x 30″ x 1″
CA-369	38114	48″	48″ x 30″ x 1″	48″ x 30″ x 1″



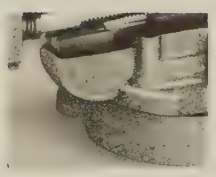
Starrett

Machinists' Vises



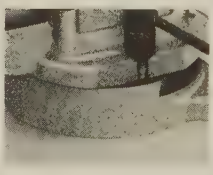


Machinists' Vises Stationary Jaw With or Without Swivel Base Nos. 923, 923½, 924, 924½, 925, 926

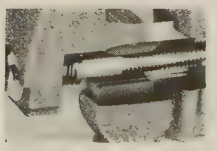


1
HEAVY HORN extension on body provides extra rigidity and slide support when vise is opened to full capacity.

2
BUTTRESS THREAD on steel screw adds 50% more strength at root of the thread—extra strong where most needed.



3
NON-SLIP SWIVEL BASE with cast internal grooves. Tapered clamp bolt with matching grooves assures rigid clamping. Clamp easy to operate, swings back out of way.



4
SPRING SCREW FASTENER holds buttress-thread screw tight with no slippage or backlash. Spring screw compensates for wear and is held securely by two collars and a pin.

5
JAW FACINGS are made of tool steel, easily replaceable. Available smooth or with deep-ground serrations.

6
FRONT AND BACK JAWS are made of high quality materials heavily sectioned at all stress points. Back jaw has 33% greater slide bearing.

WHEN you specify Starrett you get a heavy duty machinists' vise engineered and built to take life-long grueling punishment. Starrett Vises are made to rigid specifications using finest materials with carefully controlled material analysis. They meet or surpass Federal specifications. Starrett standards of manufacture provide rugged dependability in the world's finest industrial vises.

Machinists' Vises, Stationary Jaw
Nos. 923, 924, 925, 926 Series

- ★ **Brutes for Strength**
- ★ **Stronger, More Rigid Throughout**
- ★ **Greater Slide Bearing Support with Stronger Section. 33% Increase in Slide Bearing Area**
- ★ **Increased Throat Depth**
- ★ **Hardened and Ground Serrated or Smooth Jaws**
- ★ **Convenient Anvil Surface**
- ★ **Convertible from Stationary to Swivel Base**
- ★ **Durable, Attractive Finish**

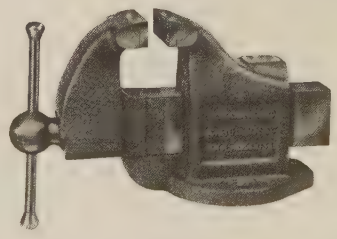
For rugged dependability you can't beat these "work-horses." High quality at economical prices. Attractive finish. Tapered no-pinch handle. Swivel base incorporates the famous Starrett positive-lock swivel—see opposite page. Designed for life-long service.

Without Swivel Base

Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Shipping Weight, lb. Without Base
923A	55728	3	4	3	26
923½A	55729	3½	5	3½	40
924A	55730	4	6	4	54
924½A	55731	4½	7	4½	73
925A	55732	5	8	5	87
926A	55733	6	9¾	6	182

Furnished with replaceable steel jaws either serrated or smooth. Serrated furnished unless otherwise specified.

Packed One in a Carton

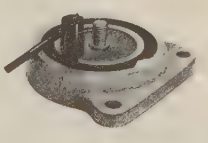


Swivel Base Kit

For above vises. Includes base, swivel base stud, clamp bolt and clamp nut.

Cat. No.	EDP No.	Fits Vise No.	Shipping Weight, lb.
923B	55740	923A	7
923½B	55741	923½A	8
924B	55742	924A	11
924½B	55743	924½A	13
925B	55744	925A	16
926B	55745	926A	20

Packed One in a Carton

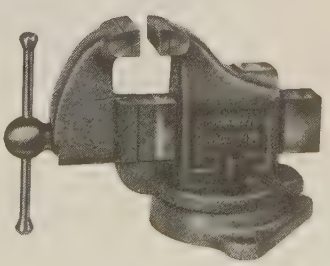


With Swivel Base

Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Shipping Weight, lb. With Base
923C	55734	3	4	3	33
923½C	55735	3½	5	3½	48
924C	55736	4	6	4	67
924½C	55737	4½	7	4½	85
925C	55738	5	8	5	103
926C	55739	6	9¾	6	205

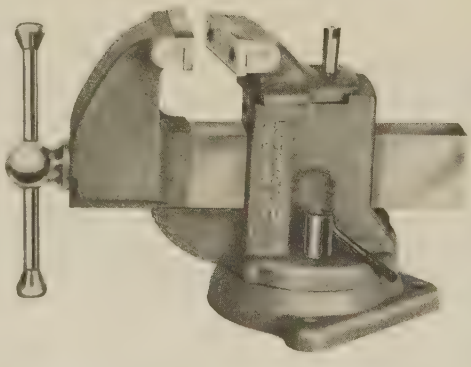
Furnished with replaceable steel jaws either serrated or smooth. Serrated furnished unless otherwise specified.

Packed One in a Carton



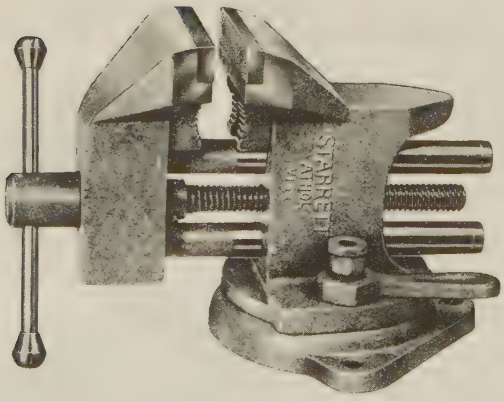
Machinists' Vises
Swivel Jaw
Swivel Base
Nos. 643½, 644½, 646

ADJUSTABLE back jaw stationary with pin in place. Removal of pin allows adjustment for tapered work with maximum gripping. Especially adaptable for tool and die room for wide range of work. Attractive finish. Tapered no pinch handle.



Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Shipping Weight lb.
643½	55746	3-1/2	4-1/2	3-1/2	43
644½	55747	4-1/2	6-1/8	4	86
646	55748	6	9-3/4	4-3/4	202

Furnished With Replaceable Steel Jaws Either Serrated or Smooth
Serrated Furnished Unless Otherwise Specified
Packed One in a Carton



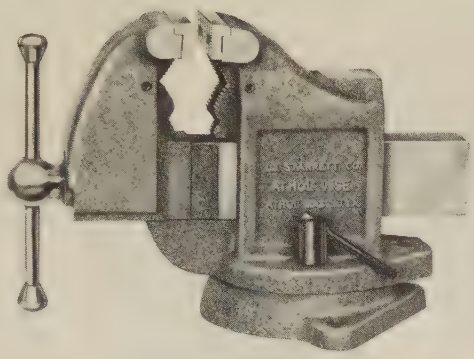
Toolmakers' Combination Vise
Stationary Jaw
Swivel Base
No. 023½

THE best for home workshop or garage. Full 1½" bearing on slides and screw. Anvil surface. Solid steel slides. Buttress thread. Swivel wrench locking. Full 360 degree swivel base. Solid-screw backthrust collar. Tapered no-pinch handle. Attractive finish.

Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Pipe Size in.	Shipping Weight lb.
023½	55750	3-1/2	3-3/4	2-3/8	1/8—1-1/4	22

Furnished With Replaceable Steel Serrated Jaws

Packed One in a Carton



Combination Pipe and Bench Vises Stationary Jaw Swivel Base Nos. 323½, 324½, 325, 326

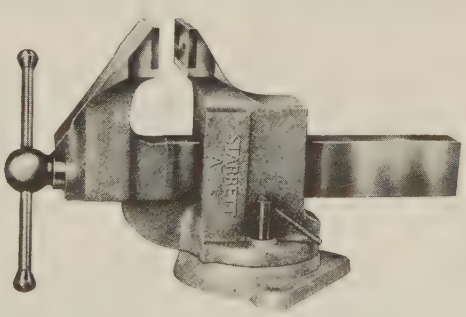
JAWS withstand strain of pipe work, made of hardened tool steel. Stands up under tough service. Easily replaceable grips do not project beyond face of vise jaws. Tapered no-pinch handle. Attractive finish.

Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Pipe Size in.	Shipping Weight lb.
323½	55752	3-1/2	4-1/4	3-7/8	1/8–2-1/2	48
324½	55753	4-1/2	6-1/4	5-1/8	1/8–3-1/2	89
325	55754	5	7-5/8	5-1/2	1/8–4-1/2	113
326	55755	6	8-5/8	7-7/16	1/4–6	225

Furnished With Replaceable Steel Serrated Jaws
Packed One in a Carton

Sheetmetal Vise Stationary Jaw Swivel Base No. 424½

DESIGNED especially for sheet-metal and wood working. Has extra-long beam and high, rigid, smooth-faced jaws to grip large pieces firmly. Made with material identical to machinists' vises. Tapered no-pinch handle. Attractive finish.



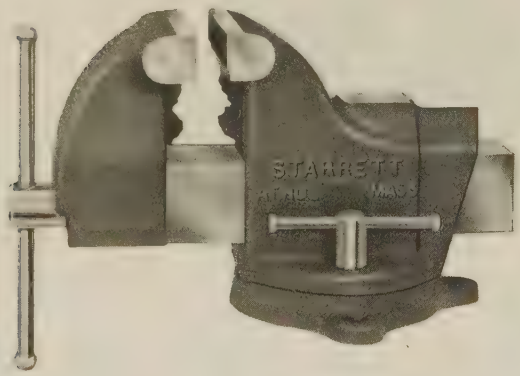
Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Shipping Weight lb.
424½	55756	4-1/2	10-1/2	6	100

Furnished With Replaceable Steel Smooth Jaws
Packed One in a Carton

Utility Vises

3½", 4", 5" Jaw Widths

Nos. 013½, 014, 015



This is the answer to the shop man or home craftsman who demands a rugged bench vise at a price that's right. Made of seasoned cast iron, the Starrett Utility Vise is massively sectioned to resist impact, leverage and torque. Its body is smoothly cast without corners and shoulders.

The vise combines maximum jaw depth and opening, and exerts powerful clamping pressure because of its all-steel screw with full form Acme thread. A machined beam encloses the screw, protecting its threads from damage during use. Additional features include replaceable jaws serrated for positive grip; auxiliary jaws for clamping pipe or round stock; machined anvil pad; integral anvil horn for forming and bending; swivel base with locking clamp and handle; three holes in base for bench mounting; rust resistant cadmium plate on handles.

Cat. No.	EDP No.	Jaw Width, in.	Maximum Jaw Opening, in.	Pipe Size in.	Jaw Depth, in.	Shipping Weight, lb.
013½C	55788	3-1/2	4	1/8—1-1/2	2-3/4	17
014C	55789	4	5	1/8—2	3-9/16	27
015C	55790	5	6	1/8—2-1/2	3-3/4	38

Packed One in a Carton

Work clamped in regular jaws for filing.

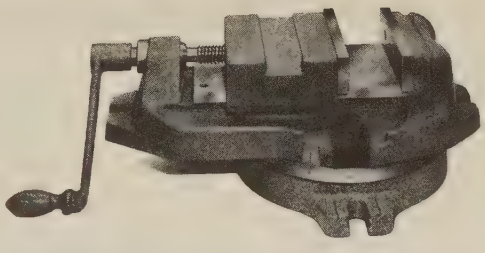
Pipe clamped in auxiliary jaws for cut-off.

Straightening sheet metal on flat anvil pad.

Forming flat stock over anvil horn.

Milling Machine Vises Nos. 1024, 1026, 1027

Moveable jaw rides on hardened steel bed plate for accuracy and durability. Coolant troughs provided around casting to contain flow of oil and chips. Swivel indexing base is removable. Base accurately graduated over 360 degrees. Easily set for any angle required. Vise can be easily removed from swivel base by loosening two bolts, and used as plain milling machine vise. Removable jaw facings made of hardened alloy tool steel. Attractive finish.



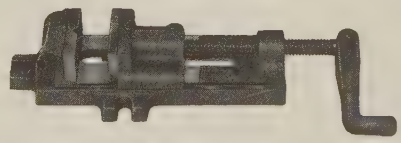
Use them in place of expensive jigs and fixtures. Dependable, Accurate.

Cat. No. with base	1024C	1026C	1027C
Cat. No. without base	1024A	1026A	1027A
EDP No. with base	55757	55758	55759
EDP No. without base	55760	55761	55762
Jaw Width, in.	4	6	7
Depth, in.	1 5/16	1 19/32	1 19/32
Max. opening, in.	3 1/8	4	4 3/4
Overall Height			
With base, in.	4 3/8	5 5/8	5 3/4
Without base, in.	2 7/8	3 3/4	3 3/4
Width without base, in.	7 3/8	9 1/4	10 3/8
Swivel base diameter, in.	8 1/4	10 1/8	11 3/8
Overall length, in.	13 7/8	17	20 1/4
With base, lb.	49	98	137
Without base, lb.	34	78	108

Sent With Swivel Base Unless Otherwise Ordered
Packed One in a Carton

Quick Adjusting Drill Press Vise No. 913½Q

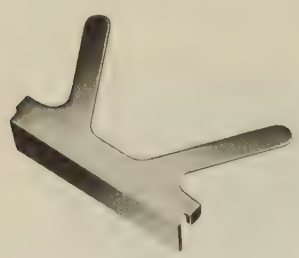
Standard Drill Press Vise No. 913½



913½Q is a convenient vise for light drilling where quick adjustment is a requirement. Lift handle to release screw. Slide movable jaw up against work. Lower handle to re-engage screw for tightening. Great time saver. Built for years of rugged service. Attractive finish. The 913½ has all the features of the 913½Q except the quick adjusting screw. Because of the completely enclosed screw it can be used on drill presses and milling machines.

Cat. No.	EDP No.	Jaw Width in.	Max. Jaw Opening in.	Jaw Depth in.	Shipping Weight lb.
913½Q	56428	3½	4½	1½	17
913½	55763	3½	4½	1½	17

Furnished With Replaceable Steel Smooth Jaws
Packed One in a Carton



Brass Vise Jaw Caps

Designed to cover serrated jaw faces snugly to prevent marking of soft materials when held rigidly. Speedily attached and removed.

Cat. No.	EDP No.	Size
JC103	55764	3"
JC103½	55765	3½"
JC104	55766	4"
JC104½	55767	4½"
JC105	55768	5"

Packed One Pair in a Box

COMPARISON CHART

Blank spaces indicate that to the best of our knowledge no competitive makes are available.

MACHINISTS' VISES—WITHOUT SWIVEL BASE

Jaw Width	STARRETT	Columbian	Hollands	Morgan	Reed	Rigid	Wilton	Yost
3"	923A	503M2	13	30	103N	31PN	300N	103
3½"	923½A	503½M2	13½	35	103½N	33PN	350N	103½
4"	924A	504M2	14	40	104N	41PN	400N	104
4½"	924½A	504½M2	14½	45	104½N	43PN	450N	104½
5"	925A	505M2	15	50	105N	51PN	500N	105
6"	926A	506M2	16	60	106N	61PN	600N	106

MACHINISTS' VISES—WITH SWIVEL BASE

3"	923C	603M2	23	130	103S	31SN	300S	203
3½"	923½C	603½M2	23½	135	103½S	33SN	350S	203½
4"	924C	604M2	24	140	104S	41SN	400S	204
4½"	924½C	604½M2	24½	145	104½S	43SN	450S	204½
5"	925C	605M2	25	150	105S	51SN	500S	205
6"	926C	606M2	26	160	106S	61SN	600S	206

MACHINISTS' VISES—SWIVEL BASE, SWIVEL JAW

3½"	643½	403½M2	43½H	335	403½R	33SJN		43½
4½"	644½	404½M2	44½H	345	404½R	43SJN	450SJ	44
6"	646	406M2	46H	360	406R			78

COMBINATION PIPE AND BENCH VISES

3½"	323½	203½M2		87	1C	33CPN	C-0	31C
4½"	324½	204½M2	53½H	88	2C	43CPN	C-1	32C
5"	325	205M2	54H	288½	3C		C-2	33C
6"	326	206M2	56H	289½	4C	61CPN	C-3	34C

SHEETMETAL VISES

4½"	424½	224½M2	264½	138	224½R	42CPSN		503

UTILITY VISES

3½"	013½	D43½	23½	350R	643½	
4"	014	D44	24	400R	644	
5"	015	D45	25	500R	645	

Starrett®

Hacksaws, Band Saws, and Hole Saws

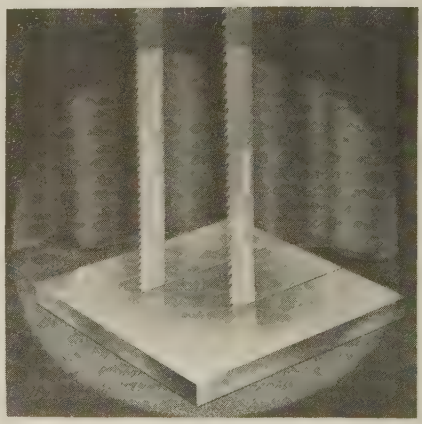
Starrett Saw Service

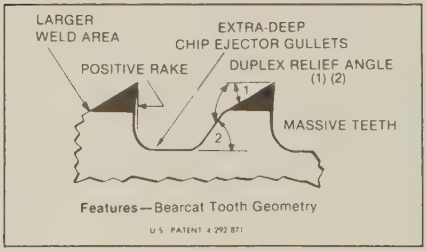
One of our Saw Division service engineers will come to your plant, inspect and adjust any machine using Starrett saw blades and any machine on which you production test our blades. He will check out all systems, making every repair and adjustment needed to put your machine in first class condition. (short of a complete overhaul)—And Starrett will pay for his time, travel, eats and sleeps. His checklist for machine condition includes belts, drives, switches; band wheel alignment and bearings; ways and slides; hydraulic and transmission oil levels; coolant quantity, condition and flow. His checklist for blade mounting and operation includes guide wear and installation; guide arm height with respect to work plus locking; blade rotation, tension, tracking; guide and blade alignment with vise; adequate vise grip; calibration of speed and feed. He can also suggest the best balance of speed, cutting rate, blade life and help you trouble-shoot problems before they arise. Ask your industrial distributor to arrange a visit through your local Starrett sales representative.

Powerband BEARCAT and VARICAT Band Saws

Bearcat and Varicat are the best band saw blades we make. Each band has a hardened high speed cutting edge electron beam welded to a high strength alloy back. Their teeth fight heat and abrasion. Their backs fight shock and flexing. Powerbands are what every high production band saw machine needs to produce to it's full potential. What more could industry ask for in high performance blades.

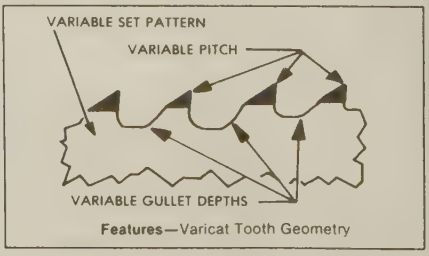
A word about Bearcat teeth. . . most saw manufacturers have a composite high speed steel, welded edge blade. But. . . take a look at their teeth. Their regular and hook teeth look like they are milled with each other's form cutters. Now take a look at our Bearcat tooth form. Bearcat teeth are big, strong and mean. Their geometry unites the best features of the regular and hook forms they are replacing. Bearcat teeth have great mass per tooth, a unique duplex relief angle and deep, chip-curling ejector gullets. The weld zone between tooth tips and backing is 20% longer, increasing shear strength 20% over conventional teeth and lessening risk of tooth stripping in heavy cuts and hard to machine materials.





Features—Bearcat Tooth Geometry

U.S. PATENT 4 292 871



Features—Varicat Tooth Geometry

Band Saw Blades—General Information

TOOTH PITCHES

CONSTANT PITCH

Regular pitch band saws have teeth of uniform spacing, set, gullet depth, rake angle and all other features throughout the entire length of the blade.

VARIABLE PITCH

In the variable pitch configuration, the size of the tooth and the depth of the gullet vary over a predetermined length. This is done to break up the harmonics that are encountered when sawing certain materials such as structurals, tubing, angles, etc. The repeatability of pattern and set are very closely controlled. A very smooth surface finish results from varying pitches as well as reducing noise levels substantially. Starrett produces two distinctly different variable pitch configurations.

VARIABLE PITCH — REGULAR TOOTH

We produce a variable pitch with regular tooth and zero rake angle. This type of variable pitch is used to cut materials of low alloy that are not extremely difficult to machine and is also useful when cutting materials of assorted sizes.

VARIABLE PITCH — VARICAT

The Varicat style of variable pitch is a Bearcat tooth form with a positive rake angle. This style of variable pitch is used for the difficult to cut, high alloy type materials. The combination of Bearcat tooth form and positive rake angle make this an extremely aggressive cutting edge, producing a high cutting rate on difficult to machine materials.

TOOTH TYPES

BEARCAT TOOTH*

Bearcat tooth blades have deep, chip-clearing gullets; massive teeth to resist chipping and to dissipate heat in production sawing; positive rake to reduce cutting stresses; and high shear strength at the weld zone because of extra long weld length. Standard on most Starrett band saw blades.

* U.S. PATENT 4,292,871

REGULAR TOOTH

Regular tooth blades are for cutting and contouring most ferrous and hard non-ferrous metals used in the shop. Straight face teeth continuously rake chips out of the saw cut.

HOOK TOOTH

Hook tooth blades have a 10° positive rake angle for fast cutting rates at reduced feed pressures. For non-ferrous metals, non-metallics and tough alloys of 3″ section and larger. Rounded gullets allow fast chip removal.

SKIP TOOTH

Skip tooth blades have a 0° rake angle. Widely spaced teeth provide extra chip clearance. Shallow gullets increase band strength. Recommended for cutting large sections of soft non-ferrous material.

Powerband BEARCAT Welded Edge High Speed Steel Band Saw Blades

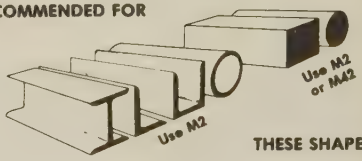
M2 EDGE – CONSTANT PITCH

PRODUCTION CUTTING

Powerband Bearcat Features–M2 Edge

- Bearcat Tooth Form (Patented)
- Positive Rake
- Massive Teeth
- Duplex Relief Angle
- Deep Chip Ejector Gullets
- Larger Weld Area

RECOMMENDED FOR



THESE SHAPES

Bearcat with an M2 edge is the ideal all-purpose production blade. It can be used to cut the widest range of materials with a high resistance to tooth chipping and stripping. The patented tooth form provides for high cutting rates at less feed pressure, resulting in straighter cuts. Composite construction—an M2 high speed steel cutting edge electron welded to a high-strength alloy steel back—plus controlled atmosphere heat treatment combines teeth of uniform high hardness (64-65, Rockwell "C" scale) and ultra sharpness with a back of exceptional toughness and fatigue resistance. This produces a blade with faster cutting action than any other band including solid high speed steel.

Greater tooth mass provides for faster heat dissipation and high shear strength at the weld zone.

Powerband BEARCAT—Specifications M2 Edge—Constant Pitch

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	150 ft. Coil	250 ft. Coil
3/8	.035	6	Bearcat	Raker	13147	—	—
1/2	.035	4	Bearcat	Raker	13148	—	—
	.035	6	Bearcat	Raker	12528	—	—
3/4	.035	3	Bearcat	Raker	—	13114	13115
	.035	4	Bearcat	Raker	—	13116	13117
	.035	6	Bearcat	Raker	—	11709	13035

Continued on next page

Powerband BEARCAT M2 EDGE—CONSTANT PITCH

Welded Edge High Speed Steel Band Saw Blades

PRODUCTION CUTTING

Powerband BEARCAT—Specifications M2 Edge—Constant Pitch (continued)

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	150 ft. Coil	250 ft. Coil
1	.035	3	Bearcat	Raker	—	13122	13123
	.035	4	Bearcat	Raker	—	11714	13043
	.035	6	Bearcat	Raker	—	11715	13045
1	.042	2	Bearcat	Raker	—	13142	13143
	.042	4	Bearcat	Raker	—	13005	13044
1¼	.042	2	Bearcat	Raker	—	13126	—
	.042	3	Bearcat	Raker	—	13127	—
	.042	4	Bearcat	Raker	—	12535	—
	.042	6	Bearcat	Raker	—	11722	—

Band Saw Blades — Troubleshooting

Machine Condition. The most common cause of blade failure is poor machine condition. Band saw machines, should be maintained on a regular basis with emphasis on such items as guide alignment and replacement as necessary, wheel alignment and camber adjustment, belts, feed pressure and hydraulic systems. When a blade is installed on the machine, care should be exercised to see that the right amount of tension is used, that the blade is tracking correctly and that all guides are adjusted to maintain blade straightness through the cut area.

Blade Breaking. Guides not set close enough to work, out of alignment or too tight. Continued tension on blade when not in use. Tension on blade too light or too heavy. Sawing dry. Blade too thick for machine. Brittle weld. Speed too slow. Feed rate too high. Using blade with too few teeth per inch.

Blade Running Out. Forcing the cut. Guides improperly spaced or out of vertical alignment. Teeth dull on one side of the blade from riding on metal wheels. Too fine a pitch for the size of material.

Premature Dulling of Teeth. Cutting speed too great. Feed pressure too light (teeth rubbing, not cutting). Guides touching tooth set. Using blade with too few teeth per inch. Too short a break-in period for blade. Sawing dry.

Teeth Ripping Out. Feed pressure too heavy. Using blade with too few teeth per inch (too big a chip per tooth, or teeth straddling work of thin section). Using blade with too many teeth per inch (chips loading in gullets). Starting cut on corner of material. Sawing dry.

Burr on Back of Blade. Only one of two back edge rollers in contact with blade. Not enough blade tension. Guides not properly set.

Grooves in Side of Blade. Guide out of alignment, too tight, dirty or worn.

Powerband II BEARCAT
M42 EDGE—CONSTANT PITCH

Welded Edge High Speed Steel Band Saw Blades
PRODUCTION CUTTING

Powerband Bearcat Features–M42 Edge

- Bearcat Tooth Form (Patented)
- Positive Rake
- Massive Teeth
- Duplex Relief Angle
- Deep Chip Ejector Gullets
- Larger Weld Area

Bearcat band saws with M42 edge and super-hard high speed steel teeth provide for rapid heat transfer in cutting high-temperature alloys, stainless steels, super alloys and high abrasive materials. Tooth hardness of 67-69, Rockwell "C" scale.

New improved deep chip-clearing gullets keep the kerf area clear of chips which provide for longer blade life and smoother cuts. These chip ejecting gullets are standard on all Bearcat band saws. Compared to conventional composite blades with regular teeth you get almost any improvement in performance you could ask for. And best of all you get Starrett service and added value engineering at competitive prices.

Powerband II BEARCAT—Specifications M42 Edge—Constant Pitch

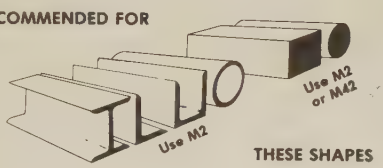
Width, Inches	Thickness, Inches	Teeth			EDP No.	
		Per Inch	Type	Set	150 ft. Coil	250 ft. Coil
3/4	.035	4	Bearcat	Raker	13230	13231
	.035	6	Bearcat	Raker	13232	13233
1	.035	3	Bearcat	Raker	13132	13133
	.035	4	Bearcat	Raker	12631	13054
	.035	6	Bearcat	Raker	12632	13056
1	.042	2	Bearcat	Raker	13144	13145
	.042	3	Bearcat	Raker	13134	13135
	.042	4	Bearcat	Raker	13017	13055
	.042	6	Bearcat	Raker	13018	13057
1¼	.042	2	Bearcat	Raker	13146	—
	.042	3	Bearcat	Raker	13136	—
	.042	4	Bearcat	Raker	13021	—
	.042	6	Bearcat	Raker	13022	—
1½	.050	2	Bearcat	Raker	13137	—
	.050	3	Bearcat	Raker	13138	—
	.050	4	Bearcat	Raker	13025	—
2	.050	2	Bearcat	Raker	13152	—
	.050	3	Bearcat	Raker	13153	—
	.050	4	Bearcat	Raker	13154	—
2-5/8	.062	1¼	Bearcat	Raker	Welded Only	
	.062	2	Bearcat	Raker	Welded Only	

Powerband VARICAT—Variable Pitch PRODUCTION CUTTING

Starrett® VARICAT

VARICAT—POWERBAND—M2 EDGE VARIABLE PITCH

RECOMMENDED FOR



THESE SHAPES

The primary advantage to variable pitch type blades is that they reduce noise and vibration considerably. The original variable tooth blade with patented Bearcat teeth has an M2 high speed steel edge which provides the best balance of metallurgical properties to resist heat, abrasion and shock in most production cutting operations. It assures faster cutting rates over a wide range of materials in production cut-off on heavy duty horizontal band saws. Positive rake angle. Tooth hardness of 64-65, Rockwell "C" scale.

VARICAT—Specifications M2 Edge—Variable Pitch

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	150 ft. Coil	250 ft. Coil
1/4	.035	10-14	Varicat	Modified	13267	—	—
3/8	.035	10-14	Varicat	Modified	13268	—	—
1/2	.035	6-10	Varicat	Modified	13269	—	—
	.035	10-14	Varicat	Modified	13270	—	—
3/4	.035	4-6	Varicat	Modified	—	13271	13275
	.035	5-8	Varicat	Modified	—	13272	13276
	.035	6-10	Varicat	Modified	—	13273	13277
	.035	10-14	Varicat	Modified	—	13274	13278
1	.035	3-4	Varicat	Modified	—	13279	13284
	.035	4-6	Varicat	Modified	—	13280	13285
	.035	5-8	Varicat	Modified	—	13281	13286
	.035	6-10	Varicat	Modified	—	13282	13287
	.035	10-14	Varicat	Modified	—	13283	13288
1	.042	4-6	Varicat	Modified	—	13289	13290
1¼	.042	3-4	Varicat	Modified	—	13291	—
	.042	4-6	Varicat	Modified	—	13292	—
	.042	5-8	Varicat	Modified	—	13293	—
	.042	6-10	Varicat	Modified	—	13294	—
1½	.050	3-4	Varicat	Modified	—	13295	—
	.050	4-6	Varicat	Modified	—	13296	—
2	.050	3-4	Varicat	Modified	—	13297	—

VARICAT—Specifications M42 Edge—Variable Pitch

Width, Inches	Thickness, Inches	Teeth			EDP No.	
		Per Inch	Type	Set	150 ft. Coil	250 ft. Coil
3/4	.035	4-6	Varicat	Modified	13298	13299
1	.035	3-4	Varicat	Modified	13300	13302
	.035	4-6	Varicat	Modified	13301	13303
	.035	5-8	Varicat	Modified	13561	13562
1	.042	3-4	Varicat	Modified	13304	13305
1¼	.042	2-3	Varicat	Modified	13306	—
	.042	3-4	Varicat	Modified	13307	—
	.042	4-6	Varicat	Modified	13308	—
	.042	5-8	Varicat	Modified	13563	—
1½	.050	2-3	Varicat	Modified	13309	—
	.050	3-4	Varicat	Modified	13310	—
	.050	4-6	Varicat	Modified	14002	—
	.050	5-8	Varicat	Modified	13564	—
2	.050	2-3	Varicat	Modified	13311	—
	.050	3-4	Varicat	Modified	13312	—
2-5/8	.062	2-3	Varicat	Modified	Welded Only	
	.062	3-4	Varicat	Modified	Welded Only	

Regular Tooth Form—Variable Pitch

POWERBAND Variable Pitch

Powerband, the original welded edge band saw blade, has an M2 high speed steel edge. The primary advantage to variable pitch type blades is that they reduce noise and vibrations considerably and are recommended for general all purpose cutting of solids, structurals and pipe. They assure faster cutting rates over a wide range of materials in production cut-off on heavy duty horizontal band saws. In narrow widths, they are used on vertical band saws for cutting small radii in hard-to-machine die steels, and keep their edge in long-run, intricate contouring jobs. Tooth hardness of 64-65, Rockwell "C" makes regular Powerband very versatile.

Powerband Regular Tooth Form—M2—Variable Pitch

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	150 ft. Coil	250 ft. Coil
1/2	.035	8-12/S	Varipitch	Modified	13980	—	—
3/4	.035	4-6/S	Varipitch	Modified	—	13088	13089
	.035	5-8/S	Varipitch	Modified	—	13981	13987
	.035	6-10/S	Varipitch	Modified	—	13090	13091
	.035	8-12/S	Varipitch	Modified	—	13982	13988
1	.035	4-6/S	Varipitch	Modified	—	13027	13062
	.035	5-8/S	Varipitch	Modified	—	13983	13989
	.035	6-10/S	Varipitch	Modified	—	13028	13064
	.035	8-12/S	Varipitch	Modified	—	13984	13990
1¼	.042	4-6/S	Varipitch	Modified	—	13029	—
	.042	5-8/S	Varipitch	Modified	—	13985	—
	.042	6-10/S	Varipitch	Modified	—	13030	—
	.042	8-12/S	Varipitch	Modified	—	13986	—
1½	.050	4-6/S	Varipitch	Modified	—	13261	—

Powerband II Regular Tooth Form—M42—Variable Pitch

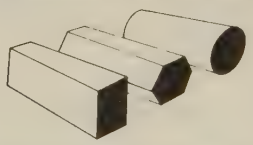
Width, Inches	Thickness, Inches	Teeth			EDP No.	
		Per Inch	Type	Set	150 ft. Coil	250 ft. Coil
3/4	.035	4-6/S	Varipitch	Modified	13991	13998
	.035	8-12/S	Varipitch	Modified	13992	13999
1	.035	4-6/S	Varipitch	Modified	13256	13257
	.035	5-8/S	Varipitch	Modified	13993	14000
	.035	8-12/S	Varipitch	Modified	13994	14001
1	.042	4-6/S	Varipitch	Modified	13258	—
1¼	.042	4-6/S	Varipitch	Modified	13260	—
	.042	8-12/S	Varipitch	Modified	13996	—
1½	.050	5-8/S	Varipitch	Modified	13997	—

Regular Tooth Form—Constant Pitch

Starrett® POWERBAND

Regular tooth form, constant pitch, is recommended for production cutting of solids and irregular shapes. This tooth form also works best when machine conditions are not ideal or when recommended feeds and speeds cannot be met.

RECOMMENDED FOR THESE SHAPES



Powerband Regular Tooth Form—M2—Constant Pitch

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	150 ft. Coil	250 ft. Coil
1/4	.035	8	Regular	Raker	13952	—	—
	.035	10	Regular	Raker	13954	—	—
	.035	14	Regular	Raker	13953	—	—
3/8	.035	6	Regular	Raker	13955	—	—
	.035	8	Regular	Raker	13956	—	—
	.035	10	Regular	Raker	13957	—	—
	.035	14	Regular	Raker	13958	—	—
1/2	.035	6	Regular	Raker	13959	—	—
	.035	8	Regular	Raker	13960	—	—
	.035	10	Regular	Raker	13961	—	—
	.035	14	Regular	Raker	13962	—	—
3/4	.035	6	Regular	Raker	—	13963	13970
	.035	8	Regular	Raker	—	13964	13971
	.035	10	Regular	Raker	—	13965	13972
1	.035	6	Regular	Raker	—	13966	13973
	.035	8	Regular	Raker	—	13967	13974
	.035	10	Regular	Raker	—	13968	13975
1¼	.042	8	Regular	Raker	—	13969	—

Powerband II Regular Tooth Form—M42—Constant Pitch

Width, Inches	Thickness, Inches	Teeth			EDP No.	
		Per Inch	Type	Set	150 ft. Coil	250 ft. Coil
1	.035	6	Regular	Raker	13976	13978
	.035	8	Regular	Raker	13977	13979

Premium
Hard Edge Tempered Back Metal Cutting Band Saw Blades

Starrett PREMIUM

This is the blade that gives you the cut above the regular flex back carbon blades. Special heat treatment produces a blade with an extremely hard cutting edge and a spring-tempered back for increased tensile strength. This permits greater tension, improved blade rigidity and straighter, more accurate cuts.

The hard tempered back provides greater blade strength which allows for higher feed pressure and higher cutting rates without sacrificing straightness of cut. Ideal for interrupted cut applications. The higher tensile strength makes this blade especially suited for contour cutting.

Furnished in bands cut to length, welded, ready to use—or in 100, 250 and 500 foot coils.

Operating Data: General information page 445. Speeds and feeds pages 468-470. Troubleshooting page 447.

Specifications

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
1/4	.025	4	Hook	Raker	10995	11070	11141
	.025	4	Skip	Raker	10985	11060	11132
	.025	6	Bearcat	Raker	10996	11071	11142
	.025	6	Regular	Raker	13892	13912	13932
	.025	6	Skip	Raker	10986	11061	11133
	.025	10	Regular	Raker	13893	13913	13933
	.025	14	Regular	Raker	13894	13914	13934
	.025	18	Regular	Raker	10941	11016	11091
	.025	24	Regular	Wavy	12910	12911	12912
	.025	32	Regular	Wavy	10971	11046	11118

Continued on next page

Premium Specifications (continued)

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
3/8	.025	3	Skip	Raker	10987	11062	11134
	.025	3	Hook	Raker	10997	11072	11143
	.025	4	Skip	Raker	10988	11063	11135
	.025	4	Hook	Raker	10998	11073	11144
	.025	6	Bearcat	Raker	10999	11074	11145
	.025	6	Regular	Raker	13895	13915	13935
	.025	8	Regular	Raker	13896	13916	13936
	.025	10	Regular	Raker	13897	13917	13937
	.025	14	Regular	Raker	13898	13918	13938
	.025	18	Regular	Raker	10946	11021	11096
1/2	.025	3	Skip	Raker	10989	11064	11136
	.025	3	Hook	Raker	11001	11076	11147
	.025	4	Skip	Raker	10990	11065	11137
	.025	4	Hook	Raker	11002	11077	11148
	.025	6	Bearcat	Raker	10948	11023	11098
	.025	6	Regular	Raker	13899	13919	13939
	.020	10	Regular	Raker	10949	11024	11099
	.025	10	Regular	Raker	13322	13323	13324
	.025	10	Regular	Wavy	10972	11047	11119
	.020	14	Regular	Raker	13900	13920	13940
	.025	14	Regular	Raker	13901	13921	13941
	.025	14	Regular	Wavy	13902	13922	13942
	.020	18	Regular	Raker	10953	11028	12519
	.025	18	Regular	Raker	10954	11029	11103
	.020	24	Regular	Wavy	12913	12914	13032
	.025	24	Regular	Wavy	10975	11050	11122
5/8	.032	8	Regular	Raker	13325	13326	13327
	.032	10	Regular	Raker	13328	13329	13330
	.032	10	Regular	Wavy	10976	11051	11123
	.032	14	Regular	Raker	13903	13923	13943
	.032	14	Regular	Wavy	13904	13924	13944
3/4	.032	3	Skip	Raker	10992	11067	11138
	.032	3	Hook	Raker	13905	13925	13945
	.032	6	Bearcat	Raker	10961	11036	11109
	.032	6	Regular	Raker	13906	13926	13946
	.032	8	Regular	Raker	13331	13332	13333
	.032	8	Regular	Wavy	10978	11053	11125
	.032	10	Regular	Raker	10963	11038	11111
	.032	10	Regular	Wavy	10979	11054	11126
	.032	14	Regular	Raker	13907	13927	13947
	.032	14	Regular	Wavy	13908	13928	13948
	.032	18	Regular	Wavy	10982	11057	11129
1	.035	2	Hook	Raker	11007	11082	11153
	.035	3	Skip	Raker	10994	11069	11140
	.035	3	Hook	Raker	13909	13929	13949
	.035	6	Bearcat	Raker	10967	11042	11114
	.035	6	Regular	Raker	13910	13930	13950
	.035	8	Regular	Raker	13337	13338	13339
	.035	10	Regular	Raker	13340	13341	13342
	.035	10	Regular	Wavy	10983	11058	11130
	.035	14	Regular	Raker	13911	13931	13951
1¼	.042	3	Bearcat	Raker	12568	12569	—
	.042	6	Bearcat	Raker	12574	12575	—

Flex-Back

Hard Edge Flexible Back Metal Cutting Band Saw Blades

Starrett has a general purpose economy blade that is made from high carbon steel, with many popular sizes available in Hook, Skip, Regular and Bearcat teeth. It combines efficient cutting performance with long-lasting service under average shop cutting conditions.

Flex-Back has an extremely hard edge and a flexible back for absorbing heavy cutting stresses—an ideal blade for a wide range of jobs and materials on standard horizontal and vertical band saw machines. Its flexibility allows it to be run faster for such jobs as cutting gates and risers off aluminum castings and many non-ferrous materials requiring the faster surface speeds.

Furnished in bands cut to length, welded, ready to use—or in 100, 250 and 500 foot coils.

Operating Data: General information page 445. Speeds and feeds pages 468-470. Troubleshooting page 447.

Flex-Back

Hard Edge Flexible Back Metal Cutting Band Saw Blades

Specifications (continued)

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
1/16	.025	24	Regular	Raker	10001	—	—
1/8	.025	14	Regular	Raker	10004	—	—
	.025	18	Regular	Raker	10005	—	—
3/16	.025	4	Skip	Raker	10073	10182	—
	.025	10	Regular	Raker	10007	10124	—
	.025	14	Regular	Raker	10008	10125	—
	.025	18	Regular	Raker	10009	10126	—
1/4	.025	4	Hook	Raker	10098	10207	10312
	.025	4	Skip	Raker	10074	10183	10287
	.025	6	Bearcat	Raker	10099	10208	10313
	.025	6	Skip	Raker	10076	10185	10289
	.025	6	Regular	Raker	13828	13846	13864
	.025	10	Regular	Raker	13829	13847	13865
	.025	14	Regular	Raker	13830	13848	13866
	.025	18	Regular	Raker	10015	10130	10239
	.025	24	Regular	Wavy	12898	12899	12900
	.025	32	Regular	Wavy	10055	10166	10271
3/8	.025	3	Skip	Raker	10077	10187	10291
	.025	4	Skip	Raker	10079	10189	10293
	.025	4	Hook	Raker	10101	10210	10315
	.025	6	Bearcat	Raker	10102	10211	10316
	.025	6	Regular	Raker	13831	13849	13867
	.025	8	Regular	Raker	13832	13850	13868
	.025	10	Regular	Raker	13833	13851	13869
	.025	14	Regular	Raker	13834	13852	13870
	.025	18	Regular	Raker	10020	10135	10244
	.025	24	Regular	Wavy	12904	12905	12906
1/2	.025	3	Skip	Raker	10083	10193	10297
	.025	3	Hook	Raker	10104	10213	10318
	.025	4	Skip	Raker	10085	10195	10299
	.025	4	Hook	Raker	10105	10214	10319
	.025	6	Bearcat	Raker	10023	10138	10247
	.025	6	Regular	Raker	13835	13853	13871
	.020	10	Regular	Raker	10024	10139	10248
	.025	10	Regular	Raker	10025	10140	10249
	.025	10	Regular	Wavy	10058	10167	10272
	.020	14	Regular	Raker	13836	13854	13872
	.025	14	Regular	Raker	13837	13855	13873
	.025	14	Regular	Wavy	13838	13856	13874
	.020	18	Regular	Raker	10028	10143	10252
	.025	18	Regular	Raker	10029	10144	10253
	.020	24	Regular	Wavy	10057	10171	10275
	.025	24	Regular	Wavy	10061	10172	10276

Continued on next page

Flex-Back
Hard Edge Flexible Back Metal Cutting Band Saw Blades
Specifications (continued)

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
5/8	.032	8	Regular	Raker	10032	10147	10255
	.032	10	Regular	Raker	10033	10148	10256
	.032	14	Regular	Raker	13839	13857	13875
3/4	.032	3	Skip	Raker	10089	10199	10303
	.032	3	Hook	Raker	14029	14030	14031
	.032	6	Bearcat	Raker	10036	10151	10259
	.032	6	Regular	Raker	13840	13858	13876
	.032	8	Regular	Raker	10037	10152	10260
	.032	10	Regular	Raker	10038	10153	10261
	.032	10	Regular	Wavy	10065	10176	10280
	.032	14	Regular	Raker	13841	13859	13877
	.032	14	Regular	Wavy	13842	13860	13878
1	.035	2	Hook	Raker	10112	10220	10325
	.035	3	Hook	Raker	13843	13861	13879
	.035	3	Skip	Raker	10094	10204	10308
	.035	6	Bearcat	Raker	10043	10158	10265
	.035	6	Regular	Raker	13844	13862	13880
	.035	8	Regular	Raker	10044	10159	10266
	.035	10	Regular	Raker	10045	10160	10267
	.035	10	Bearcat	Raker	13376	13377	13378
	.035	14	Regular	Raker	13845	13863	13881

Friction Cutting Band Saw Blades

Operated at up to 15,000 feet per minute on band saw machines for cutting ferrous metals in sheets up to 5/8″ thick—or irregular work that cannot be conveniently sawed. Made of a high silicon alloy, they have a strong flexible back, a hard edge to stand up under the frictional heat required to raise work to its softening point, and raker set with "air scoop" action that brings oxygen into the kerf to burn up the metal. 10-tooth blades are for material 1/4″ to 5/8″ thick; 14-tooth blades for material 1/16″ to 1/4″ thick.

Furnished in bands cut to length, welded, ready to use—or in 100, 250 and 500 foot coils.

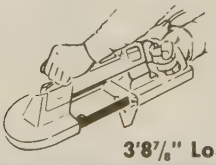
Width, Inches	Blade Type	Thickness, Inches	Teeth			EDP No.		
			Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
1/2	Friction	.032	10	Regular	Raker	10116	10224	10329
	Friction	.032	14	Regular	Raker	10117	10225	10330
3/4	Friction	.035	10	Regular	Raker	10120	10228	10333
	Friction	.035	14	Regular	Raker	10121	10229	10334
1	Friction	.035	8	Regular	Alternate	14619	14620	14621
	Friction	.035	10	Regular	Raker	10122	10230	10335
	Friction	.035	14	Regular	Raker	10123	10231	10336

Friction Sawing Suggested Speeds

Work Thickness	stpm	
Teeth Per Inch	1/16" - 1/4"	1/4" - 5/8"
	14	10
Carbon Steel, 1008-1095	6,000	9,000
Free Machining Steel, 1108-1151	6,000	9,000
C1212-C1213	6,000	9,000
Manganese Steel, 1320-1345	6,000	9,000
1513-1572	6,000	9,000
Molydbenum Steel, 4023-4068	8,000	12,000
Chrome-Molybdenum Steel, 4120-4150	8,000	12,000
Nickel-Chrome Molybdenum Steel, 4317-4340	8,000	12,000
8615-8750	8,000	12,000
9310-9850	8,000	12,000
Nickel Molybdenum Steel, 4608-4820	8,000	12,000
Chrome Steel, 5045-5160	8,000	12,000
50100-52100	8,000	12,000
Chrome-Vanadium Steel, 6117-6152	8,000	12,000
Silicon Steel, 9255-9262	8,000	12,000
Stainless Steel 200, 300, 400 Series	7,000	10,000
Cast Iron-Meehanite	7,000	10,000
Cast Steel	7,000	10,000
Armor Plate	7,000	10,000

NOTE: Ferrous metals over 5/8" may be friction sawed provided maximum machine speed is used and the work is "rocked" during cutting.

Blades for Portable Band Saw Machines



Four Starrett blade types in lengths and teeth per inch for all standard machines. Raker set teeth. Supplied cut to length and welded, ready to install and use. Packed three bands per box. Also available in coil stock.

3'8⅞" Long x ½" Wide x .020" Thick

For Black & Decker, Greenlee, Milwaukee, Rockwell Porta-Band and Ridgid Machines

Teeth per Inch	Flex-Back		Premium		Solid High Speed Steel		Powerband Bi-metal	
	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.
10	HE10	10338	PR10	11156	HS10	11582	BM10	14600
14	HE14	10340	PR14	11157	HS14	11583	BM14	14601
18	HE18	10341	PR18	11158	HS18	11584	BM18	14602
24	HE24	10343	PR24	11159	HS24	13113	BM24	14603

4'5¾" Long x ½" Wide x .020" Thick

For Greenlee and Rockwell Porta-Band Machines

10	RHE10	13170	RPR10	13165	RHS10	13161	RBM10	14604
14	RHE14	13171	RPR14	13166	RHS14	13076	RBM14	14605
18	RHE18	13172	RPR18	13167	RHS18	13162	RBM18	14606
24	RHE24	13173	RPR24	13168	RHS24	13163	RBM24	14607

4'6" Long x ½" Wide x .025" Thick

For Ensley, Greenlee and Millers Falls Machines

6	GHE6	10346	GPR6	11160	—	—	—	—
10	GHE10	10347	GPR10	11161	GHS10	11586	—	—
14	GHE14	10348	GPR14	11162	—	—	—	—
18	GHE18	10349	GPR18	11163	—	—	—	—
24	GHE24	10350	GPR24	11164	—	—	—	—

Diamond Coated Band Saw Blades

This blade is the answer for cutting space age and tough to machine materials. The straight line cutting action of a Starrett Diamond edge band saw gives exceptionally fast cutting rates as well as accuracy, parallelism, flatness and finish of cut unobtainable through other methods. Starrett Diamond coated edge band saw blades, combined with a high flex backing material, provides the industry with a very effective means of cutting today's and tomorrow's wide range of problem materials. Self-sharpening, their cutting action reaches greatest efficiency at high speeds. Roller guides are recommended for use with diamond blades.

Specifications

Width, Inches	Thickness, Inches	Tooth Type	GRIT		
			FINE	MED	COARSE
1/2	.025	Gulleted	—	60/85	—
	.025	Continuous	85/100	60/85	—
3/4	.032	Gulleted	—	60/85	44/60
	.032	Continuous	—	60/85	—
1	.035	Gulleted	—	60/85	44/60
	.035	Continuous	—	60/85	—
1¼	Available on request				

Available only in welded to length sizes. Ready to use.

GULLETED

CONTINUOUS

CUTTING RECOMMENDATIONS

Materials*	Band Speed SFM	Coolant	Sq. Inches Per Min.
Glass reinforced plastic (GRP)	1000-3000	No	8-10
Fiberglass laminated	1000-3000	Yes	10-15
Ceramics	250-1000	Yes	1-7
Glass	500-1000	Yes	3-5
Quartz (Fused)	1000-2000	Yes	6-10
Granite	500-3500	Yes	4-18
Marble	2000-3000	Yes	13-15
Masonry materials	1000-2000	Yes	6-10
Transite	2000-2500	Yes	10-12
Wire reinforced rubber	1000-3000	Yes	10-15
Asbestos-Cement pipe	1000-2000	Yes	10-12
Silicon	250-500	Yes	1-2
Pyrex	500-1000	Yes	3-5

* If a specific material is not listed, select conditions for a similar material or contact your Starrett Distributor.

Woodpecker
Production Wood Cutting Band Saw Blades

For production sawing of hardwoods used in the manufacture of furniture and cabinets and all other production wood cutting operations. Available in regular and heavy gage with deep gullets for good chip removal. Hardened edge, flexible back with raker or alternate set teeth, as designated. Furnished in bands cut to length, welded, ready to use – or in 100, 250 and 500 foot coils.

Specifications

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
1/4	.032	4	Hook	Alternate	12594	12603	12612
	.032	4	Skip	Alternate	12626	12627	12637
3/8	.025	3	Hook	Alternate	14480	14481	14482
	.032	3	Hook	Alternate	12595	12604	12613
	.032	3	Skip	Alternate	12596	12605	12614
	.032	4	Hook	Alternate	12597	12606	12615
	.032	4	Skip	Alternate	12598	12607	12616
1/2	.025	3	Hook	Alternate	14477	14478	14479
	.032	3	Hook	Alternate	12599	12608	12617
	.032	3	Skip	Alternate	12600	12609	12618
	.032	4	Hook	Alternate	12601	12610	12619
	.032	4	Skip	Alternate	12602	12611	12620
1	.035	2	Hook	Raker	14483	14484	14485
	.035	3	Hook	Raker	14486	14487	14488

Wood Cutting Band Saw Blades

For cutting and contouring all kinds of wood. Can be resharpened and reset. Large round gullets for efficient chip clearance. Furnished with teeth alternate set and filed.

Specify .020" thick bands in lengths under 8 feet, heavier thicknesses for longer lengths, Furnished in bands cut to length, welded, ready to use – or in 100 and 250 foot coils.

Specifications (Filed and Set)

Width, Inches	Thickness, Inches	Teeth per Inch	EDP No.	
			100 ft. Coil	250 ft. Coil
1/4	.020	6	11769	11810
	.028	4	11770	11811
	.028	5	14836	14837
	.028	6	11771	11812
	.032	4	11772	11813

Wood Cutting Band Saw Blades (Cont.)
Specifications (Filed and Set)

Width, Inches	Thickness, Inches	Teeth per Inch	EDP No.	
			100 ft. Coil	250 ft. Coil
3/8	.020	5	11774	11815
	.028	4	11775	11816
	.028	5	11776	11817
1/2	.020	5	11779	11820
	.025	4	14822	14823
	.025	5	14824	14825
	.032	4	11784	11825
	.032	5	11785	11826
5/8	.028	4	11786	11827
	.032	3	11787	11828
	.032	4	11788	11829
3/4	.025	4	14826	14827
	.032	2	11791	11832
	.032	3	11792	11833
	.032	4	11793	11834
1	.032	2	14828	14829
	.032	3	11796	11837
	.032	4	11797	11838
1¼	.032	2	14830	14831
	.032	3	14832	14833
1½	.032	2	14834	14835

Meat Kutter Band Saw Blades

For use on butcher band saw machines. Skip tooth, alternate set. Hard edge, flexible back. Furnished in bands cut to length, welded, ready to use—or in 100, 250 and 500 foot coils.

Specifications

Width, Inches	Thickness, Inches	Teeth			EDP No.		
		Per Inch	Type	Set	100 ft. Coil	250 ft. Coil	500 ft. Coil
1/2	.025	4	Skip	Alternate	11986	11991	11996
5/8	.018	4	Skip	Alternate	12621	12622	12623
	.018	5	Skip	Alternate	11990	11995	12000
	.025	5	Skip	Alternate	11988	11993	11998

Fast-Kut Band Knives

Straight Edge

Scallop Edge

Wavy Edge

Vee Tooth Edge

Band knives have a slicing action. They produce no chips, no waste, no ragged edges in trimming, cutting apart or stack cutting soft or fibrous materials. In ordering, specify single or double bevel edge. Furnished in bands cut to length, welded, ready to use—or in 100 ft. coils.

Specifications

Width, Inches	Thickness, Inches	EDP No. 100 ft. Coil
Straight Edge—Single Bevel		
1/4	.020	12053
3/8	.020	12058
1/2	.020	12063
3/4	.020	14842
	.025	14843
1	.020	14844
	.025	14845
	.032	14846
Straight Edge—Double Bevel		
1/4	.020	14861
3/8	.020	12119
	.028	12117
1/2	.020	12124
	.025	14864
	.032	14865
3/4	.020	14866
	.025	14867
	.032	12129
1	.020	14868
	.025	14869
	.032	14870
1 1/4	.020	14871
1 1/2	.020	14872
	.025	14873
	.032	14874
2	.032	14875
	.035	14876
2 1/2	.035	14877
3	.035	14878
Scallop Edge—Single Bevel—1/2" Pitch		
1/4	.020	14847
3/8	.020	14848
1/2	.020	14849
3/4	.020	14850
1	.020	14851
	.025	14852
	.032	14853
Scallpe Edge—Double Bevel—1/2" Pitch		
1/4	.020	14879
3/8	.020	14880
	.032	14881
1/2	.020	14882
	.025	14883
	.032	14884
Scallop Edge—Double Bevel—1/2" Pitch (Cont.)		
3/4	.020	14885
	.025	14886
	.032	12215
1	.020	14887
	.025	14888
	.032	14889
1 1/4	.020	14890
	.025	14891
	.032	14892
Wavy Edge—Single Bevel—3/4" Pitch		
1/4	.020	14854
3/8	.020	14855
1/2	.020	14856
3/4	.020	14857
1	.020	14858
	.025	14859
	.032	14860
Wavy Edge—Double Bevel—3/4" Pitch		
1/4	.020	14893
3/8	.020	14894
	.028	14895
1/2	.020	14896
	.025	14897
3/4	.020	14898
	.025	14899
	.032	12306
1	.020	14900
	.025	14901
	.032	12315
1 1/4	.020	14902
	.025	14903
	.032	14904

Width, Inches	Thickness, Inches	Teeth per Inch	EDP No. 100 ft. Coil
Vee Tooth Edge—Double Bevel			
1/4	.020	10	14905
	.020	14	14906
3/8	.020	10	14907
	.020	14	14908
1/2	.020	10	14909
	.020	14	14910
	.025	10	14911
	.025	14	14912
3/4	.020	10	14913
	.020	14	14914
	.025	10	14915
	.025	14	14916
1	.020	10	14917
	.020	14	14918
	.025	10	14919
	.025	14	14920
	.032	10	14921
	.032	14	14922
1 1/4	.020	10	14923
	.020	14	14924
	.025	10	14925
	.025	14	14926
	.032	10	14927
	.032	14	14928

MACHINING SUGGESTIONS FOR CUTTING PIPE & TUBING, STRUCTURAL SECTIONS (BEAMS, CHANNELS, AND ANGLES)

The pitch selected must allow at least two teeth, and preferably three teeth in the work during cutting thin sections at all times.

The cutting rates for tubing or pipe must be slower than for cutting solid material for the same size, but maintain the speed.

Reduce rates from those recommended for solids of the same size by using the appropriate factor based upon the minimum wall thickness.

Sometimes a reduction in the feed pressure in such cases allows the blade to vibrate. If this occurs, slightly reduce or increase the band speed.

Minimum wall thickness of section to be sawed up to 3/16″, reduce to 40% of the cutting rate given for comparable solid material.

Wall Thickness — 3/16″ to 3/8″ — Reduce to 50%.
Wall Thickness — 3/8″ to 5/8″ — Reduce to 60%.
Wall Thickness — 5/8″ and over — Reduce to 70%.

VARIABLE PITCH

In this pitch configuration, the size of the tooth and the depth of the gullet vary over a predetermined length. This is done to break up the harmonics or vibrations that are encountered when sawing certain materials such as structurals and tubing.

Using a variable pitch blade results in a very smooth surface finish and will reduce noise levels.

Variable pitch is produced in two distinctly different configurations, and is available in many tooth combinations for cutting applications.

Variable pitch with regular tooth and zero rake angle is used to cut materials of low alloy that are not diffucult to machine and is also used when cutting materials of assorted sizes.

Varicat with Bearcat tooth form with a positive rake angle is a modification of variable pitch used for cutting the more difficult high alloy type materials.

This combination of Bearcat tooth form and positive rake angle has an extremely aggressive cutting action which reduces cutting stresses and increases the cutting rate on the more difficult to machine materials.

(Continued on next page)

MACHINING SUGGESTIONS FOR CUTTING PIPE & TUBING, STRUCTURAL SECTIONS (BEAMS, CHANNELS, AND ANGLES)—Continued

Selection of the variable pitch which most closely matches to the tooth range recommended on the saw selector chart will give good cutting results.

When using the Carbon type band saw blade with regular tooth form, reduce speed and the cutting rate 20% from that recommended for the Bearcat tooth form in the cutting recommendations listed.

When using the POWERBAND with regular tooth form, including variable pitch, reduce the cutting rate and speed by 20% from those recommended for Bearcat tooth form.

Machining Suggestions for Powerband and Solid High Speed Bands with BEARCAT and Regular Teeth

The following tables list preferred band type, tooth selections, speeds and cutting rates for production sawing with Bearcat Powerband.

BREAK-IN is recommended for every new blade, to assure long blade life and optimum performance: Maintain recommended speed and reduce feed pressure to about ½ to ⅔ the normal feed, but be sure teeth are removing a chip. After the first 50 square inches cut, increase feed gradually on successive cuts until the desired cutting rate is obtained.

CUTTING INFORMATION

- Whenever possible, follow the tabulated recommendations.
- When cutting with more teeth per inch (1 or 2 pitches finer) than recommended, maintain speed and expect a 50% reduction in cutting rate.
- When cutting at a slower speed than recommended, expect a proportionate reduction in cutting rate.

NOTE: FOR POWERBAND WITH BEARCAT TEETH USE SPEEDS AND CUTTING RATES SHOWN.

NOTE: FOR POWERBAND WITH REGULAR TOOTH FORM, INCLUDING VARIABLE PITCH, REDUCE THE CUTTING RATE AND SPEED 20% FROM THOSE SHOWN.

Material	Hardness	Preferred Band Type	Material Width	Teeth per inch	Speed Ft./Min.	Cutting Rate Sq. in/Min.
Free Machining Carbon Steels 1212-1215	HB150	M2	1/2-1	8-6	390-475	20-25
			1-2	6-4	360-450	22-27
			2-5	4-3	325-400	25-30
			5-8	3-2	325-400	25-30
			►8	2	250-300	19-23
Free Machining Carbon Steels 1110,1117,1118 1144,1211	HB150	M2	1/2-1	8-6	390-475	12-16
			1-2	6-4	360-450	13-18
			2-5	4-3	325-400	15-20
			5-8	3-2	325-400	15-20
			►8	2	250-300	11-15
Free Machining Carbon Steels 1137,1139,1140 1141,1146,1151	HB150	M2	1/2-1	8-6	330-390	8-12
			1-2	6-4	300-360	9-13
			2-5	4-3	275-325	10-15
			5-8	3-2	275-325	10-15
			►8	2	200-250	7-11

► Indicates larger than.

Powerband—H.S.S. Band Machining Suggestions

Material	Hardness	Preferred Band Type	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
Low Carbon Steels 1005-1026 1513-1527	HB150	M2	1/2-1	8-6	360-425	12-16
			1-2	6-4	330-385	13-18
			2-5	4-3	300-350	15-20
			5-8	3-2	300-350	15-20
			►8	2	225-260	11-15
Medium Carbon Steels 1029-1055	HB175	M2	1/2-1	8-6	270-330	8-10
			1-2	6-4	250-300	9-11
			2-5	4-3	225-275	10-12
			5-8	3-2	225-275	10-12
			►8	2	175-200	7-9
High Carbon Steels 1060-1095 1561-1572	HB200	M2	1/2-1	8-6	240-300	6-8
			1-2	6-4	220-275	7-9
			2-5	4-3	200-250	8-10
			5-8	3-2	200-250	8-10
			►8	2	150-190	6-7
Low Carbon Alloy Steels 4012-4028 4118,4320 4419-4427 4615-4626 4718-4720 4815-4820 5115-5120 6118,8115,8615 8627,8720,8822 9310,94B17	HB175	M2	1/2-1	8-6	300-360	7-9
			1-2	6-4	275-330	8-10
			2-5	4-3	250-300	9-11
			5-8	3-2	250-300	9-11
			►8	2	190-225	7-8
Medium Carbon Alloy Steels 1330-1345 4130-4161 4340,300M,D6 50B40-50B60 5130-5160 6150-81B45 8630-8660 8740,94B30 9254-9260	HB200	M2	1/2-1	8-6	270-330	6-8
			1-2	6-4	250-300	7-9
			2-5	4-3	225-275	8-10
			5-8	3-2	225-275	8-10
			►8	2	175-200	6-7
High Carbon Alloy Steels 50100,51100 52100,M50	HB225	M42	1/2-1	8-6	180-240	3-4
			1-2	6-4	165-220	4
			2-5	4-3	150-200	4-5
			5-8	3-2	150-200	4-5
			►8	2	110-150	3
Nitriding Steels Nitralloy 125 Nitralloy 135	HB225	M2	1/2-1	8-6	210-270	4-6
			1-2	6-4	200-250	4-6
			2-5	4-3	175-225	5-7
			5-8	3-2	175-225	5-7
			►8	2	125-175	3-5
Maraging Steels 120-350	HB275	M42	1/2-1	8-6	180-240	2.5-3
			1-2	6-4	165-220	2.5-4
			2-5	4-3	150-200	3-4
			5-8	3-2	150-200	3-4
			►8	2	110-150	2-3
Tool Steels P2-P6	HB150	M2	1/2-1	8-6	270-330	6-7
			1-2	6-4	250-300	6-8
			2-5	4-3	225-275	7-9
			5-8	3-2	225-275	7-9
			►8	2	175-200	5-7
Tool Steel A2-A6,A8-10 H10-H19,L2-L6 01-07,P20-P21 W1-W5	HB200	M2	1/2-1	8-6	270-330	3-4
			1-2	6-4	250-300	4
			2-5	4-3	225-275	4-5
			5-8	3-2	225-275	4-5
			►8	2	175-200	3

Powerband—H.S.S. Band Machining Suggestions

Material	Hardness	Preferred Band Type	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
Tool Steels			1/2-1	8-6	180-240	2.5-3
			1-2	6-4	165-220	2.5-4
F1-F2	HB200	M2	2-5	4-3	150-200	3-4
H21-H43			5-8	3-2	150-200	3-4
S1-S7			►8	2	110-150	2-3
Tool Steels			1/2-1	8-6	120-180	2.5-3
			1-2	6-4	110-165	2.5-4
M1,M2,M3-1	HB225	M42	2-5	4-3	100-150	3-4
M7,M10,T1			5-8	3-2	100-150	3-4
T2,T4			►8	2	75-110	2-3
Tool Steels			1/2-1	8-6	90-150	1.5-2.5
			1-2	6-4	80-140	2-2.5
A7,D2-D7	HB250	M42	2-5	4-3	75-125	2-3
M3-2,M4,M30-M47			5-8	3-2	75-125	2-3
T5-T15			►8	2	55-95	1.5-2
Free Machining Stainless Steels			1/2-1	8-6	150-210	3-5
			1-2	6-4	140-200	4-5
	HB150	M42	2-5	4-3	125-175	4-6
			5-8	3-2	125-175	4-6
303			►8	2	95-125	3-4
Free Machining Stainless Steels			1/2-1	8-6	210-270	4-6
			1-2	6-4	200-250	4-6
	HB150	M42	2-5	4-3	175-225	5-7
416, 420F			5-8	3-2	175-225	5-7
430F			►8	2	125-175	3-5
Stainless Steels			1/2-1	8-6	150-180	2.5-3
201,202,301,			1-2	6-4	140-165	2.5-4
302,304,305,	HB150	M42	2-5	4-3	125-150	3-4
308,321			5-8	3-2	125-150	3-4
347,348			►8	2	95-110	2-3
Stainless Steels			1/2-1	8-6	90-120	1.5-2.5
			1-2	6-4	80-110	2-2.5
309, 310	HB175	M42	2-5	4-3	75-100	2-3
314, 316			5-8	3-2	75-100	2-3
317, 330			►8	2	55-75	1.5-2
Stainless Steels			1/2-1	8-6	150-180	2.5-4
403, 410			1-2	6-4	140-165	2.5-4
	HB175	M42	2-5	4-3	125-150	3-5
420, 501			5-8	3-2	125-150	3-5
			►8	2	95-110	2-3
Stainless Steels			1/2-1	8-6	120-150	2.5-3
405, 409,			1-2	6-4	110-140	2.5-4
430, 434,	HB175	M42	2-5	4-3	100-125	3-4
436, 442,			5-8	3-2	100-125	3-4
446, 502			►8	2	75-95	2-3
Stainless Steels			1/2-1	8-6	120-150	2.5-3
414, 431			1-2	6-4	110-140	2.5-4
	HB225	M42	2-5	4-3	100-125	3-4
440A, 440B, 440C			5-8	3-2	100-125	3-4
			►8	2	75-95	2-3
Precipitation Hardening Stainless			1/2-1	8-6	90-120	1.5-2.5
15-5PH,17-4PH			1-2	6-4	80-110	2-2.5
	HB200	M42	2-5	4-3	75-100	2-3
17-7PH,PH13-8Mo			5-8	3-2	75-100	2-3
PH15-7Mo			►8	2	95-100	1.5-2
Cast Iron			1/2-1	8-6	240-300	12-16
			1-2	6-4	220-275	13-18
Gray Iron	HB125	M2	2-5	4-3	200-250	15-20
Class 20			5-8	3-2	200-250	15-20
			►8	2	150-190	11-15
Cast Iron			1/2-1	8-6	180-240	8-12
			1-2	6-4	165-220	9-13
Gray Iron	HB200	M2	2-5	4-3	150-200	10-15
Class 40			5-8	3-2	150-200	10-15
			►8	2	110-150	7-11

Powerband—H.S.S. Band Machining Suggestions

Material	Hardness	Preferred Band Type	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
Cast Iron Gray Iron Class 60	HB275	M42	1/2-1	8-6	120-180	4-6
			1-2	6-4	110-165	4-6
			2-5	4-3	100-150	5-7
			5-8	3-2	100-150	5-7
			►8	2	75-110	3-5
Cast Iron Ductile and Malleable	HB150	M2	1/2-1	8-6	270-330	12-16
			1-2	6-4	250-300	13-18
			2-5	4-3	225-275	15-20
			5-8	3-2	225-275	15-20
			►8	2	175-200	11-15
Cast Iron Ductile and Malleable	HB225	M2	1/2-1	8-6	180-240	8-12
			1-2	6-4	165-220	9-13
			2-5	4-3	150-200	10-15
			5-8	3-2	150-200	10-15
			►8	2	110-150	7-11
Cast Iron Ductile and Malleable	HB300	M42	1/2-1	8-6	120-180	4-6
			1-2	6-4	110-165	4-6
			2-5	4-3	100-150	5-7
			5-8	3-2	100-150	5-7
			►8	2	75-110	3-5
Cast Iron Austenitic	HB125	M42	1/2-1	8-6	120-150	1.5-2.5
			1-2	6-4	110-140	2-2.5
			2-5	4-3	100-125	2-3
			5-8	3-2	100-125	2-3
			►8	2	75-95	1.5-2
Cast Iron Austenitic	HB200	M42	1/2-1	8-6	90-120	1-1.5
			1-2	6-4	80-110	1-2
			2-5	4-3	75-100	1-2
			5-8	3-2	75-100	1-2
			►8	2	55-75	1-1.5
Nickel Alloys Monels Inconels Incoloys Hastelloys	HB250	M42	1/2-1	8-6	70-110	.5-1.5
			1-2	6-4	65-100	.5-2
			2-5	4-3	60-90	.5-2
			5-8	3-2	60-90	.5-2
			►8	2	45-65	.5-1.5
Titanium Alloys 99% Titanium	HB150	M42	1/2-1	8-6	120-150	1-1.5
			1-2	6-4	110-140	1-2
			2-5	4-3	100-125	1-2
			5-8	3-2	100-125	1-2
			►8	2	75-95	1-1.5
Titanium Alloys Alpha, Alpha Beta, Beta	HB325	M42	1/2-1	8-6	60-80	.5-1
			1-2	6-4	55-75	.5-1
			2-5	4-3	50-70	.5-1
			5-8	3-2	50-70	.5-1
			►8	2	40-50	.5-1
Copper Alloys 99.9% Copper	HRB50	M2	1/2-1	8-6	210-270	6-10
			1-2	6-4	200-250	7-11
			2-5	4-3	175-225	8-12
			5-8	3-2	175-225	8-12
			►8	2	125-175	6-9
Copper Alloys Free Cutting Brass	HRB70	M2	1/2-1	8-6	450-500	25-32
			1-2	6-4	450-500	27-36
			2-5	4-3	400-450	30-40
			5-8	3-2	400-450	30-40
			►8	2	300-340	23-30
Copper Alloys Yellow Brass Red Brass Manganese Bronze Silicon Bronze	HRB70	M2	1/2-1	8-6	390-450	9-12
			1-2	6-4	360-410	10-13
			2-5	4-3	325-375	12-16
			5-8	3-2	325-375	12-16
			►8	2	250-275	9-12
Copper Alloys Phosphor Bronze	HRB70	M2	1/2-1	8-6	210-270	6-10
			1-2	6-4	200-250	7-11
			2-5	4-3	175-225	8-12
			5-8	3-2	175-225	8-12
			►8	2	125-175	6-9

Powerband—H.S.S. Band Machining Suggestions

Material	Hardness	Preferred Band Type	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
Copper Alloys Aluminum Bronze	HRB70	M2	1/2-1	8-6	390-450	9-12
			1-2	6-4	360-410	10-13
			2-5	4-3	325-375	12-16
			5-8	3-2	325-375	12-16
			►8	2	250-275	9-12
Copper Alloys Aluminum Bronze (Hardened)	HRC30	M42	1/2-1	8-6	120-150	1-1.5
			1-2	6-4	110-140	1-2
			2-5	4-3	100-125	1-2
			5-8	3-2	100-125	1-2
			►8	2	75-95	1-1.5
Copper Alloys Beryllium Copper	HRB70	M2	1/2-1	8-6	270-300	3-4
			1-2	6-4	250-275	4
			2-5	4-3	225-250	4-5
			5-8	3-2	225-250	4-5
			►8	2	175-190	3
Copper Alloys Beryllium Copper (Hardened)	HRC38	M42	1/2-1	8-6	60-80	.5-1
			1-2	6-4	55-75	.5-1
			2-5	4-3	50-70	.5-1
			5-8	3-2	50-70	5-1
			►8	2	40-50	5-1

Machining Suggestions for Carbon Type Bands with BEARCAT and Regular Tooth Form

The following tables list cutting recommendations for Bearcat Tooth Flex-Back and Premium band saw blades. Since the Bearcat Tooth Form is an aggressive cutting edge, following these recommendations will produce results not obtainable with old style tooth forms.

NOTE: FOR CARBON TYPE BANDS WITH REGULAR TOOTH FORM REDUCE CUTTING RATE AND SPEED 20% FROM THOSE SHOWN.

Material	Hardness	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
Free Machining Carbon Steels 1212-1215	HB150	◄1/2	24-14	225-250	2-3
		1/2-1	10-8	225-250	2.5-3.5
		1-2	8-6	225-250	2.5-3.5
		2-4	6-4	200-225	3-4
		4-7	4-3	200-225	3-4
Free Machining Carbon Steels 1110,1117,1118 1144,1211	HB150	◄1/2	24-14	225-250	1-2
		1/2-1	10-8	225-250	1.5-2.5
		1-2	8-6	225-250	1.5-2.5
		2-4	6-4	200-225	2-3
		4-7	4-3	200-225	2-3
Free Machining Carbon Steels 1137,1139,1140 1141,1146,1151	HB175	◄1/2	24-14	225-250	1-1.5
		1/2-1	10-8	200-225	1-1.5
		1-2	8-6	180-210	1.3-1.8
		2-4	6-4	160-190	1.5-2
		4-7	2-3	160-190	1.5-2
Low Carbon Steels 1005-1026 1513-1527	HB150	◄1/2	24-14	225-250	1-2
		1/2-1	10-8	225-250	1.5-2.5
		1-2	8-6	200-225	1.5-2.5
		2-4	6-4	180-210	2-3
		4-7	4-3	180-210	2-3
Medium Carbon Steels 1029-1055	HB175	◄1/2	24-14	150-175	0.7-1
		1/2-1	10-8	130-160	0.9-1.2
		1-2	8-6	125-150	1.1-1.4
		2-4	6-4	100-130	1.2-1.6
		4-7	4-3	100-130	1.2-1.6

◄ Indicates smaller than.

BEARCAT Machining Suggestions for Carbon-Type Bands

Material	Hardness	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
High Carbon Steels 1060-1095 1561-1572	HB200	◄1/2	24-14	130-150	0.7-1.0
		1/2-1	10-8	120-140	0.8-1.1
		1-2	8-6	100-125	0.9-1.2
		2-4	6-4	90-120	1-1.3
		4-7	4-3	90-120	1-1.3
Low Carbon Alloy Steels 4012-4028, 4118, 4320 4419-4427, 4615-4626 4718-4720, 4815-4820 5115-5120, 6118, 8115 8615, 8627, 8720 8822, 9310, 94B17	HB175	◄1/2	24-14	125-150	0.5-0.8
		1/2-1	10-8	110-130	0.6-0.9
		1-2	8-6	100-125	0.7-1
		2-4	6-4	90-120	0.8-1.2
		4-7	4-3	90-120	0.8-1.2
Medium Carbon Alloy Steels 1330-1345, 4130-4161 4340, 300M, D6 50B40-50B60, 5130-5160 6150-81B45, 8630-8660 8740, 94B30 9254-9260	HB200	◄1/2	24-14	110-130	0.4-0.7
		1/2-1	10-8	100-125	0.5-0.8
		1-2	8-6	90-120	0.6-0.9
		2-4	6-4	75-100	0.7-1
		4-7	4-3	75-100	0.7-1
High Carbon Alloy Steels 50100, 51100 52100, M50	HB225	◄1/2	24-14	110-130	0.2-0.4
		1/2-1	10-8	100-125	0.3-0.5
		1-2	8-6	90-110	0.4-0.6
		2-4	6-4	80-100	0.4-0.6
		4-7	4-3	80-100	0.4-0.6
Maraging Steels 120-350	HB275	◄1/2	24-14	100-125	0.2-0.4
		1/2-1	10-8	90-110	0.3-0.5
		1-2	8-6	80-100	0.3-0.5
		2-4	6-4	70-90	0.4-0.6
		4-7	4-3	70-90	0.4-0.6
Tool Steels P2-P6	HB150	◄1/2	24-14	150-175	0.3-0.5
		1/2-1	10-8	140-160	0.4-0.6
		1-2	8-6	125-150	0.4-0.6
		2-4	6-4	100-130	0.5-0.7
		4-7	4-3	100-130	0.5-0.7
Tool Steels A2-A6, A8-A10 H10-H19, L2-L6 O1-O7, P20-P21 W1-W5	HB200	◄1/2	24-14	150-175	0.3-0.5
		1/2-1	10-8	140-160	0.3-0.5
		1-2	8-6	125-150	0.3-0.5
		2-4	6-4	100-130	0.4-0.6
		4-7	4-3	100-130	0.4-0.6
Tool Steels F1-F2 H21-H43, S1-S7	HB200	◄1/2	24-14	125-150	0.3-0.5
		1/2-1	10-8	110-130	0.3-0.5
		1-2	8-6	100-120	0.3-0.5
		2-4	6-4	90-110	0.4-0.6
		4-7	4-3	90-110	0.4-0.6
M1, M2, M3-1 M7, M10, T1 T2, T4	HB225	◄1/2	24-14	120-140	0.2-0.4
		1/2-1	10-8	100-125	0.3-0.5
		1-2	8-6	90-110	0.3-0.5
		2-4	6-4	80-100	0.4-0.6
		4-7	2-3	80-100	0.4-0.6
Tool Steels A7, D2-D7 M3-2, M4, M30-M47 T5-T15	HB250	◄1/2	24-14	100-120	0.1-0.3
		1/2-1	10-8	90-110	0.1-0.3
		1-2	8-6	80-100	0.1-0.3
		2-4	6-4	70-90	0.2-0.4
		4-7	4-3	70-90	0.2-0.4
Free Machining Stainless Steels 303	HB150	◄1/2	24-14	100-120	0.3-0.5
		1/2-1	10-8	100-120	0.3-0.5
		1-2	8-6	90-110	0.4-0.6
		2-4	6-4	60-80	0.4-0.6
		4-7	4-3	60-80	0.4-0.6
Free Machining Stainless Steels 416, 420F, 430F	HB150	◄1/2	24-14	100-120	0.3-0.5
		1/2-1	10-8	90-110	0.4-0.6
		1-2	8-6	80-100	0.5-0.7
		2-4	6-4	70-90	0.5-0.7
		4-7	4-3	70-90	0.5-0.7

BEARCAT Machining Suggestions for Carbon-Type Bands

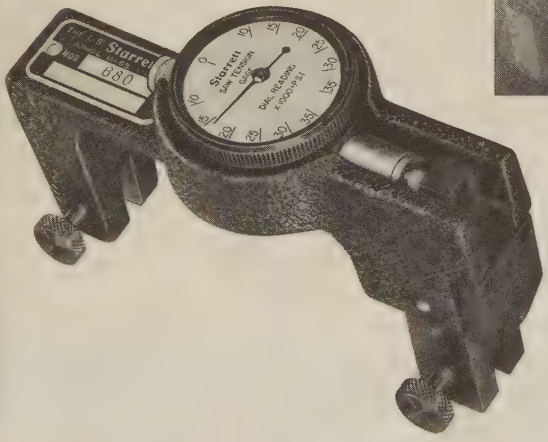
Material	Hardness	Material Width	Teeth per Inch	Speed Ft./Min.	Cutting Rate Sq. In/Min.
Stainless Steels 201, 202, 301, 302, 304, 305, 308, 321, 347, 348	HB150	◄1/2	24-14	100-120	0.1-0.3
		1/2-1	10-8	100-120	0.1-0.3
		1-2	8-6	80-100	0.1-0.3
		2-4	6-4	60-80	0.2-0.4
		4-7	4-3	60-80	0.2-0.4
Stainless Steels 309, 310, 314 316, 317, 330	HB175	◄1/2	24-14	80-100	0.1-0.2
		1/2-1	10-8	70-90	0.1-0.3
		1-2	8-6	60-80	0.1-0.3
		2-4	6-4	50-70	0.1-0.3
		4-7	4-3	50-70	0.1-0.3
Stainless Steels 403, 410, 420, 501	HB175	◄1/2	24-14	100-120	0.1-0.3
		1/2-1	10-8	100-120	0.2-0.4
		1-2	8-6	80-100	0.2-0.4
		2-4	6-4	60-80	0.3-0.5
		4-7	4-3	60-80	0.3-0.5
Stainless Steels 405, 409, 430 434, 436, 442 446, 502	HB175	◄1/2	24-14	90-110	0.1-0.2
		1/2-1	10-8	90-110	0.2-0.3
		1-2	8-6	70-90	0.2-0.3
		2-4	6-4	60-80	0.2-0.4
		4-7	4-3	50-70	0.2-0.4
Stainless Steels 414, 431 440A, 440B, 440C	HB225	◄1/2	24-14	80-100	0.1-0.2
		1/2-1	10-8	70-90	0.1-0.3
		1-2	8-6	60-80	0.2-0.3
		2-4	6-4	50-70	0.2-0.3
		4-7	4-3	50-70	0.2-0.3
Precipitation Hardening Stainless Steel 14-5PH, 17-4PH 17-7PH, PH13-8Mo PH15-7Mo	HB200	◄1/2	24-14	80-100	0.1-0.2
		1/2-1	10-8	70-90	0.1-0.2
		1-2	8-6	60-80	0.1-0.2
		2-4	6-4	50-70	0.1-0.3
		4-7	4-3	50-70	0.1-0.3
Cast Iron Gray Iron Class 20	HB125	◄1/2	24-14	140-160	0.6-0.8
		1/2-1	10-8	125-150	0.7-0.9
		1-2	8-6	110-140	0.8-1.0
		2-4	6-4	100-125	0.9-1.2
		4-7	4-3	100-125	0.9-1.2
Cast Iron Gray Iron Class 40	HB200	◄1/2	24-14	100-125	0.4-0.6
		1/2-1	10-8	90-110	0.5-0.7
		1-2	8-6	80-100	0.6-0.8
		2-4	6-4	70-90	0.7-0.9
		4-7	4-3	70-90	0.7-0.9
Cast Iron Ductile and Malleable	HB150	◄1/2	24-14	150-175	0.6-0.8
		1/2-1	10-8	140-160	0.7-0.9
		1-2	8-6	125-150	0.8-1.0
		2-4	6-4	110-140	0.9-1.2
		4-7	4-3	110-140	0.9-1.2
Cast Iron Ductile and Malleable	HB225	◄1/2	24-14	100-125	0.4-0.6
		1/2-1	10-8	90-110	0.5-0.7
		1-2	8-6	80-100	0.5-0.7
		2-4	6-4	70-90	0.6-0.9
		4-7	4-3	70-90	0.6-0.9
Aluminum, Magnesium Lead, Zinc, Graphite		◄1/2	24-14	3500	*
		1/2-1	10-8	3500	*
		1-2	8-6	3000	*
		2-4	6-4	3000	*
		4-7	4-3	3000	*
Hardwood, Plywood Plastic		◄1/2	24-14	4500	*
		1/2-1	10-8	4000	*
		1-2	8-6	4000	*
		2-4	6-4	3500	*
		4-7	4-3	3000	*

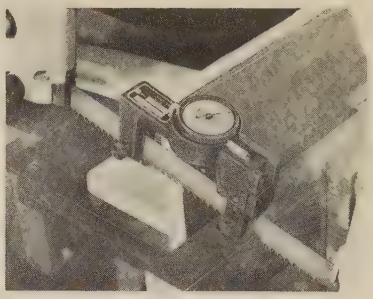
* Use Flex-Back Only—1-2 Pitches Coarser Than Listed

Saw Tension Gage

Direct Reading—0 to 35,000 psi

No. 680Z (EDP No. 56426)





In gaging position on band saw machine

Without proper tension, a power hacksaw blade or band saw blade cannot deliver the cutting efficiency built into it by its manufacturer. Not enough tension leads to blade runout, accelerated wear, poor finish on work. Too much tension can cause a blade to break.

Using this gage, blade tension can be precisely adjusted for particular materials or conditions and accurately repeated when necessary. Since it reads tension directly in pounds per square inch rather than pounds direct pull, all blade sizes can be properly tensioned without referring to specific requirements for each size.

The adjustable, balanced dial is graduated 35-0-35 x 1000 psi, allowing measurement of existing tension on a blade or allowing tension to be set when installing a blade on the machine. Large knurled knobs allow easy attachment and removal without tools. Furnished with instruction on how to use, including suggested tensions for Starrett hacksaw and band saw blades.

Also available in English and Metric.

Furnished in Attractive, Protective Case.

Packed One in A Box.

Tensioning Power Hacksaw Blades Using Torque Wrench

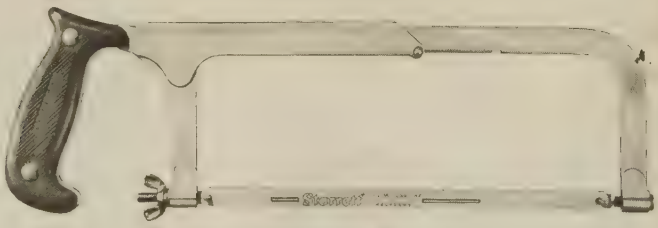
Use this table to tension Starrett Power blades correctly using a torque wrench. Check your reading after one or two cuts and increase the tension slightly as the blade becomes stabilized in position. With machines where the saw blade is tensioned by lever action, use approximately 50% of these readings.

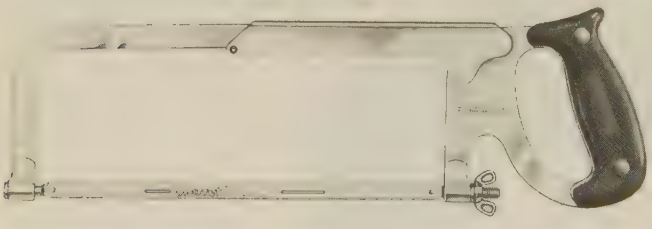
Blade Width	Redstripe High Speed	Greenstripe High Speed
	Torque Wrench Readings (Approx.)	
1"	125 in.-lbs.	150 in.-lbs.
1-1/4"	175 in.-lbs.	200 in.-lbs.
1-1/2"	200 in.-lbs.	225 in.-lbs.
1-3/4"	225 in.-lbs.	250 in.-lbs.
2"	250 in.-lbs.	275 in.-lbs.
2-1/2"	275 in.-lbs.	300 in.-lbs.

Hacksaw Frames

Heavy Duty—For 8", 10" and 12" Blades

No. 151
Open Pistol Grip





No. 152
Closed Pistol Grip

No. 152 has an enclosed pistol grip to protect fingers, yet provides plenty of room for heavy work gloves. No. 151 has an open pistol grip to reduce handling time of jobs where extra finger protection is not needed. Both frames take 8, 10 and 12-inch blades which can be mounted in any one of four cutting directions and tensioned by a single wing nut.

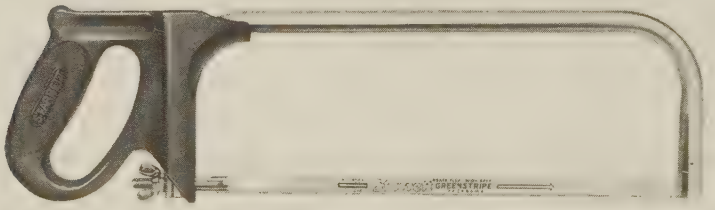
These frames have a rectangular section stressed for working pressure. The wing nut is out of the way of cutting. The knurled handle, an easy-to-identify red, is comfortably fitted to the hand and has a steel core through its full length for extra strength. Sent with high speed steel blade.

Cat. No.	EDP No.	Description	Blade Size
151	55970	Open Grip	8", 10" and 12"
152	50576	Closed Grip	8", 10" and 12"

Packed one in a box, 10 boxes to a carton

No. 149 Hacksaw Frame

Tubular Construction—For 12" Blades



No. 149 TUBULAR HACKSAW FRAME. Made from one piece 5/8" tubular steel for strength and rigidity. The serrated handle made of high impact plastic with closed grip assures a positive grip and comfortable feel, a Starrett tradition.

Loosening a single wing nut makes blade changing easy, and the blade may be held and tensioned with teeth pointing down or to either side. Sent with Starrett 12" high speed steel blade.

Cat. No.	EDP No.	Description	Blade Size
149	56614	Closed Grip	12"

Packed one in a box, 10 boxes to a carton

Saw Division Information

The quality of our products and their performance in your plant are in the hands of people who care.

They are the manufacturing specialists who control quality, operate manufacturing equipment, conduct final inspection, pack and ship your order in colorful, protective cartons.

They are the sales and service specialists who provide technical counsel, run metallurgical and blade life tests, and match the right Starrett saw blade to your materials, machines, cost and production goals.

The combined talents of these dedicated employees are yours through your Starrett industrial distributor and five sales and service centers in principal metalworking areas.

Redstripe®

Molybdenum High Speed Steel

Hand Hacksaw Blades

For use where work is held securely in position. Extra long wear life. Holds edge in cutting hard-to-machine alloys. Uniformly hardened from cutting edge through back. Maintains straightness of cut. Preferred for rigidity by experienced machinists and toolmakers.

Packaging. 100 hand blades per box — 10 bundles — 10 blades per bundle. 10 heavy duty hand and light power blades per box.

Hand Sizes

Length x Width x Thickness, Inches	Teeth per Inch	Cat. No.	EDP No.
10 x ½ x .025	18	RS1018	40019
	24	RS1024	40020
	32	RS1032	40021
12 x ½ x .025	14	RS1214	40022
	18	RS1218	40023
	24	RS1224	40024
	32	RS1232	40025

Heavy Duty Hand and Light Power Sizes

12 x ⅝ x .032	14	RS1214-3	40026
	18	RS1218-3	40027

Heavy Duty Hand and Light Power Blades

Heavy duty hand and light power hacksaw blades provide greater body strength for cutting large size work at increased speed and feed. Available in Redstripe and Greenstripe, they fit standard hand frames. Also used on light duty power hacksaw machines.

Greenstripe®

Safe-Flex High Speed Steel

Hand Hacksaw Blades

Shatter resistant. For gang sawing, interrupted cuts, work of uneven section, and for sawing in hard-to-reach or cramped places where the blade is subject to bending and twisting stresses. Hardened high speed steel teeth; tough, shock-absorbing back. High production, long life, plus user safety.

Packaging. 100 hand blades per box — 10 bundles — 10 blades per bundle. 10 heavy duty hand and light power blades per box.

Hand Sizes

Length x Width x Thickness, Inches	Teeth per inch	Cat. No.	EDP No.
10 x ½ x .025	18	SF1018	40028
	24	SF1024	40029
	32	SF1032	40030
12 x ½ x .025	14	SF1214	40031
	18	SF1218	40032
	24	SF1224	40033
	32	SF1232	40034

Heavy Duty Hand and Light Power Sizes

12 x ⅝ x .032	14	SF1214-3	40035
	18	SF1218-3	40036

Bluestripe®
Bi-Metal

High Speed Steel

Hand Hacksaw Blades

Bluestripe Bi-Metal Hand Hacksaws. A welded edge high speed steel blade with a tough alloy steel back that has the same cutting efficiency and wear resistance of an all hard HSS blade but provides a high resistance to breaking. A high production blade for any machinable material.

Packaging. 100 hand blades per box — 10 bundles — 10 blades per bundle.

Hand Sizes

Length x Width x Thickness, Inches	Teeth per inch	Cat. No.	EDP No.
10 x ½ x .025	18	BS1018	40037
	24	BS1024	40038
12 x ½ x .025	14	BS1214	40040
	18	BS1218	40041
	24	BS1224	40042
	32	BS1232	40043

Grey-Flex®

Carbon Steel

Hand Hacksaw Blades

These all-purpose economy blades are for cutting mild steel, copper, brass, aluminum and similar materials. They combine a hardened cutting edge with a tough, flexible back. Balanced wear resisting and mechanical shock absorbing properties. Will not shatter.

Hand Sizes

Length x Width x Thickness, Inches	Teeth per Inch	Cat. No.	EDP No.
10 x ½ x .025	18	GF1018	40011
	24	GF1024	40012
	32	GF1032	40013
12 x ½ x .032	14	GF1214	40014
	18	GF1218	40015
	24	GF1224	40016
	32	GF1232	40017

Packing: 100 Blades per Box—10 Bundles—10 Blades per Bundle

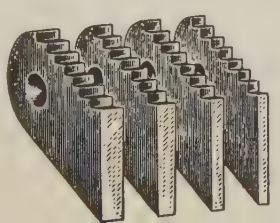
No. 249 Screw Slotting Hacksaw Blades

Four Sizes For Cutting Slots in Screw Heads
and For Many Other Small Shop Slotting Jobs—Eliminates Machine Set-Ups

When it is necessary to slot only a few screw heads, much time can be saved using these blades. They will fit any adjustable hacksaw frame, eliminating time needed to set up a machine.

Used in thousands of machine shops and garages, they are also useful for undercutting inside corners and cutting flats on shafts for set screws. One sawing job using these handy blades can more than pay for several sets by eliminating a time-consuming machine set-up.

Each blade is hardened throughout for maximum rigidity plus keen cutting edge. Straight milled teeth provide smooth cutting action and nice finish. Each blade tapers in thickness from cutting edge to back to prevent binding and allow quick, easy cutting.



Cat. No.	EDP No.	Length, Width	Approx. Thickness of Teeth	Teeth Per Inch
249A	51188	8" x ½"	.049"	14
249B	51189	8" x ½"	.065"	14
249C	51190	8" x ½"	.083"	14
249D	51191	8" x ½"	.109"	14
249E	51192	Set of Four Blades, one each 249A, B, C, D		

249A, B, C, D Packed 12 in a Box;
249E One Set in a Box.

Power Hacksaw Blades

Redstripe Molybdenum High Speed Steel

For general purpose cut-off jobs. Solid high speed steel, hardened from top edge to cutting edge for maximum red hardness and rigidity. Long wear life and top performance in sawing a wide range of materials including stainless and other tough-to-cut alloy steels.

Greenstripe Safe-Flex High Speed Steel

For hard-to-saw metals, ganged work pieces, materials of uneven or interrupted section. Shatterproof construction — a hardened high speed steel cutting edge welded to a tough, flexible back combines high efficiency cut-off with resistance to mechanical shocks and stresses.

Power Hacksaw Blades

Teeth Per Inch v. Saw Contact Area v. Speed and Feed

Power blades with 3, 4, and 6 teeth per inch are for cutting soft materials and heavy, solid bars of stock. Power blades with 10 and 14 teeth per inch are for cutting harder materials and stock of smaller size. Selection of teeth per inch based on saw contact area can be made from this table:

Selecting Speed and Feed. Data in the following table is based on sawing 3" diameter round stock using a blade with six teeth per inch. Use coolant on all materials except cast iron.

Notes: To cut cross sections smaller than 3" diameter, select blade from "teeth per inch—saw contact area" table and increase speed 25%. To cut cross sections larger than 3" diameter, select blade from "teeth per inch—saw contact area" table and decrease speed 25%.

No. of Teeth Per Inch	Saw Contact Area
3	4" to 12"
4	2" to 6"
6	3/8" to 4"
10	1/4" to 1/2"
14	Less than 1/4"

Material	Speed, Strokes Per Minute	Feed, Sq. Inches Per Minute
Aluminum	120 to 150*	2.0 to 4.5
Brass	120* to 150	1.5 to 3.5
Bronze	90* to 120	0.5 to 1.5
High Density Alloys (Udimet, Waspaloy, Inconel, etc.)	30* to 60	0.2 to 0.7
Cast Iron	90* to 120	1.5 to 3.0
High Nickel Alloys	60* to 90	0.8 to 1.5
Low to Medium Carbon Steel	120* to 150	2.0 to 3.0
Tool Steel	60 to 90*	0.5 to 2.0
High Speed Steel	60* to 90	0.5 to 1.0
Stainless Steel	60* to 90	0.5 to 1.5
Structurals	120 to 150*	—

*Recommended speed.

Power Hacksaw Blades

Specifications

Length x Width x Thickness, Inches	Teeth per Inch	Redstripe		Greenstripe	
		Cat. No.	EDP No.	Cat. No.	EDP No.
12 x 1 x .050	10	RS1210-5	40046	SF1210-5	40097
	14	RS1214-5	40047	SF1214-5	40098
14 x 1 x .050	10	RS1410-5	40049	SF1410-5	40099
	14	RS1414-5	40050	SF1414-5	40100
14 x 1¼ x .062	6	RS1406-6	40051	SF1406-6	40101
	10	RS1410-6	40052	SF1410-6	40102
14 x 1½ x .075	4	RS1404-7	40053	SF1404-7	40104
	6	RS1406-7	40054	SF1406-7	40105
17 x 1 x .050	10	RS1710-5	40059	SF1710-5	40110
	14	RS1714-5	40060	SF1714-5	40111
17 x 1¼ x .062	6	RS1706-6	40062	SF1706-6	40113
	10	RS1710-6	40063	SF1710-6	40114
18 x 1¼ x .062	6	RS1806-6	40064	SF1806-6	40115
	10	RS1810-6	40065	SF1810-6	40116
18 x 1½ x .075	4	RS1804-7	40067	SF1804-7	40118
	6	RS1806-7	40068	SF1806-7	40119
18 x 1¾ x .088	4	RS1804-8	40070	SF1804-8	40121
	6	RS1806-8	40071	SF1806-8	40122
21 x 1¾ x .088	4	RS2104-8	40075	SF2104-8	40126
	6	RS2106-8	40076	SF2106-8	40127
24 x 2 x .100	3	RS2403-0	40080	SF2403-0	40131
	4	RS2404-0	40081	SF2404-0	40132
30 x 2½ x .100	2½	RS3002½-0	40190	—	—
	4	RS3004-0	40083	SF3004-0	40172

Redstripe Metric Blades For Kasto Machines

Length x Width x Thickness		Teeth per Inch or 25 mm	Redstripe		Fits Kasto Machine No.
mm	Inches		Cat. No.	EDP No.	
350 x 32 x 2	14 x 1-1/4 x .075	6	RS350-6	40177	UBS 200
		10	RS350-10	40178	
400 x 32 x 2	16 x 1-1/4 x .075	4	RS400-4	40179	VBS 242
		6	RS400-6	40180	
		10	RS400-10	40181	
450 x 40 x 2	18 x 1-1/2 x .075	4	RS450-4	40182	UBS 280
		6	RS450-6	40183	
		10	RS450-10	40184	
550 x 45 x 2	22 x 1-3/4 x .075	4	RS550-4	40173	UBS 320
		6	RS550-6	40174	
		10	RS550-10	40185	
575 x 52 x 2.5	23 x 2 x .100	4	RS575-4	40175	EBS 320
		6	RS575-6	40176	
650 x 55 x 2.5	26 x 2-3/16 x .100	4	RS650-4	40186	EBS 400
		6	RS650-6	40187	
700 x 55 x 2.5	28 x 2-3/16 x .100	4	RS700-4	40188	EBS 450
		6	RS700-6	40189	

Packing: 10 Blades per Box

Operating Data: Speeds and feeds page 476. Tensioning page 471. Comparison chart page 478.

Hand and Power Hacksaw Blades Comparison Chart

MANUFACTURER	HAND HACKSAW BLADES				POWER HACKSAW BLADES	
	Carbon Steel	Flexible High Speed	All Hard High Speed	Bi-Metal High Speed	Welded Edge High Speed Steel	All Hard Molyb-denum
STARRETT	Grey-Flex	"Safe-Flex" Greenstripe	Redstripe	Bi-Metal Bluestripe	"Safe-Flex" Greenstripe	Redstripe
American Saw (Lenox)	Carbon Steel			Hackmaster 2	Hackmaster	
Armstrong Blum (Marvel)		Carbon 60	Exemplar		High Speed Edge	
Capewell	Flex-Tung			Bi-Met Safe-Tech	Safe-Tech	
Clemson	Unbreak-able Special	Moly-Flex	Moly		Moly-Flex Welded Edge	Moly
Diamond		Hi-Carbon Flexible	Molyb-denum	Bi-Flex	Bi-Flex Welded Edge	Molyb-denum
Do All	Standard		Molyb-denum	Imperial Bi-Metal	Bi-Metal High Speed	
Eclipse-Atlantic	Flexible Standard	Flexible High Speed	All Hard High Speed	Hi-Cut Welded Edge	Welded Edge	All Hard
Ladish	Flexible	Moly-Flex	Moly			
Millers Falls	Tuf-Flex	Blu-Flex	Blu-Mol		Blu-Mol Jet Edge	Blu-Mol
Nicholson	Std. Steel Flex.	Flexible HS	All Hard Molyb-denum		Welded Edge	All Hard Molyb-denum
Sandvik	Gold-Flex	Cut-Flex	Sandcut	Sand-Flex	Bi-Metal High Speed	
Simonds	Easy-Start Standard	Easy-Start Shatter-proof	Molyb-denum	High Speed Weld-Edge Steel	Welded Edge High Speed	High Speed Molyb-denum
Spartan	Flexard	Saf-T-Saw	Kutall		Saf-T-Saw	Kutall
Henry G. Thompson (Milford)	Flexible Standard	Flexible Rezister	All Hard Rezistor		Bi-Metal Rezistor Welded Edge	Bi-Metal Rezistor
Victor	Unbreak-able Special	Moly-Flex	Moly	Moly-Weld	Moly-Flex Welded	Moly

Hole Saws — Safe-Flex, Carbide Grit, Diamond

No. H0214 Safe-Flex Hole Saw on No. A2 Quik-Hitch Arbor

Safe-Flex High Speed Steel Welded Edge Hole Saws

A Hardened high speed steel cutting edge welded to a tough alloy steel body cuts through any machinable material including cast iron, tool and stainless steel, brass, bronze, aluminum, plastics and wood. This bonded construction saves money through uninterrupted production and contributes to user safety on the job.

Safe-Flex Hole Saws are used in production and maintenance operations, and in the building trades for preparing installation holes through floors and partitions. Fifty standard diameters from 9/16" through 6" with arbors that readily fit machine tools and portable drills. All sizes have six teeth per inch with alternate set. 1-1/4" maximum cutting depth.

No. X0212 Carbide Grit Hole Saw on No. XA2 Quik-Hitch Arbor

Carbide Grit Hole Saws

These hole saws cut ceramics, plastics, glass resins, asbestos and other abrasive materials that wear out the teeth of conventional hole saws. They have a tough steel body with multiple carbide grits permanently bonded to the cutting edge. Self-sharpening, their cutting action reaches greatest efficiency at high speeds. There are no teeth to break, no binding action when used in portable drills, and no rough edges left in the hole. Twenty diameters from 7/8" through 4-1/2". 1-1/8" maximum cutting depth.

No. D0216 Diamond Hole Saw on No. XA2 Quik-Hitch Arbor

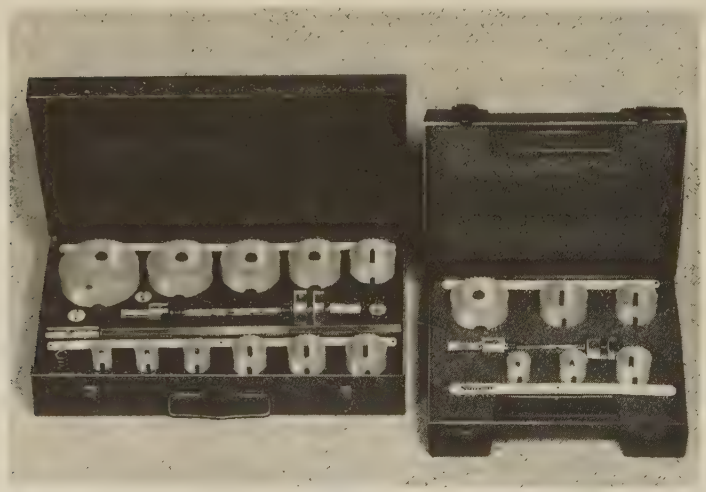
Diamond Hole Saws

New Starrett Diamond Hole Saws rapidly cut glass reinforced plastics, glass resin, germanium, asbestos, asbestos substitutes, ceramics and other abrasive materials.

The diamond coated cutting tooth edge provides the necessary clearance for high cutting speeds. Further advantages when using diamond hole saws to cut abrasive material include long life, clean cut holes and efficient core ejection. Fifty-one diameters from 9/16" through 6" with 1-1/4" maximum cutting depth.

Hole Saw Kits

Safe-Flex High Speed Hole Saws and Arbors in Handy Kits for Electricians and Plumbers, Industrial and Locksmiths



Hole Saw Kits No. K291 and K292

Cat. No. K290—EDP No. 56011

Electricians' and Plumbers' Hole Saw Kit in Metal Carrying Case

Nine popular size hole saws used to install piping, tubing, conduit and cable in residential, commercial and industrial plumbing and electrical work. Includes A2 Arbor (7/16″ hex shank, fits 1/2″ chuck); A4 Arbor (1/4″ round shank, fits 1/4″ chuck); A5 Extension (12″ long, for A2 Arbor); and the following Safe-Flex Regular High Speed Steel Hole Saws: H0034 (3/4″), H0078 (7/8″), H0118 (1-1/8″), H0138 (1-3/8″), H0112 (1-1/2″), H0134(1-3/4″), H0200 (2″), H0214 (2-1/4″), and H0212 (2-1/2″).

Packed one kit in a box.

Cat. No. K291—EDP No. 56012

Industrial Hole Saw Kit in Metal Carrying Case

Eleven hole saws for toolroom, production and plant maintenance use. Includes A2 Arbor (7/16″ hex shank, fits 1/2″ chuck); A4 Arbor (1/4″ round shank, fits 1/4″ chuck); A5 Extension (12″ long, for A2 Arbor; A7 Ejector Spring (fits over pilot drill); and the following Safe-Flex Regular High Speed Steel Hole Saws: H0034 (3/4″), H0078 (7/8″), H0100 (1″), H0114 (1-1/4″), H0138 (1-3/8″), H0112 (1-1/2″). H0134 (1-3/4″), H0200 (2″), H0214 (2-1/4″), H0212 (2-1/2″), and H0300 (3″).

Packed one kit in a box.

Cat. No. K292—EDP No. 56811

Lockset Hole Saw Kit in Plastic Case

Six of the most popular sizes with two arbors used by locksmiths. Includes one each H0078 (7/8″), H0100 (1″), H0114 (1-1/4″), H0112 (1-1/2″), H0134 (1-3/4″) and H0218 (2-1/8″) hole saws; and one each A1 and A10 arbors. Complete in plastic case.

Packed one kit in a box.

Safe-Flex High Speed, Carbide Grit and Diamond Hole Saws

Hole saws are marked with diameter in inches and millimeters. In ordering, specify catalog number, regular, carbide grit or diamond, and diameter. Hole saws sent without arbors unless otherwise ordered. Packed one in a box. See next page for arbors.

Specifications

High Speed		Carbide Grit		Diamond		Saw Diameter		Pipe Tap		Pipe Entrance		Use Arbor No.
Cat. No.	EDP No.	Cat. No.	EDP No.	Cat. No.	EDP No.	In.	mm	In.	mm	In.	mm	
H0096	55078			D0096	56704	9/16	14					A1, A4 or A11
H0058	55079			D0058	56705	5/8	16					
H1016	55080			D1016	56706	11/16	17					
H0034	55081			D0034	56707	3/4	19			3/8	10	A1, A4 or A11
				D2532	56708	—	20					
H1036	55082			D1036	56709	13/16	21					
H0078	55083	X0078	55919	D0078	56710	7/8	22	3/4	19	1/2	13	A1, A4 or A11
H1056	55084			D1056	56711	15/16	24					
H0100	55085	X0100	55920	D0100	56712	1	25					
H0116	55086	X0116	55921	D0116	56713	1 1/16	27					A1, A4 or A11
H0118	55087			D0118	56714	1 1/8	29	1	25	3/4	19	
H0136	55088			D0136	56715	1 3/16	30					
H0114	55089	X0114	55922	D0114	56716	1 1/4	32					A2, A3, A6 or A10
H0156	55090	X0156	55923	D0156	56717	1 5/16	33					
H0138	55091			D0138	56718	1 3/8	35			1	25	
H0176	55092			D0176	56719	1 7/16	37					A2, A3, A6 or A10
H0112	55093	X0112	55924	D0112	56720	1 1/2	38	1 1/4	32			
H0196	55094			D0196	56721	1 9/16	40					A2, A3 or A10
H0158	55095	X0158	55925	D0158	56722	1 5/8	41					
H1116	55096			D1116	56723	1 11/16	43					
H0134	55097	X0134	55926	D0134	56724	1 3/4	44	1 1/2	38	1 1/4	32	A2, A3 or A10
H1136	55098			D1136	56725	1 13/16	46					
H0178	55099			D0178	56726	1 7/8	48					
H0200	55100	X0200	55927	D0200	56727	2	51			1 1/2	38	A2, A3 or A10
H0216	55101			D0216	56728	2 1/16	52					
H0218	55102	X0218	55928	D0218	56729	2 1/8	54					
H0214	55103	X0214	55929	D0214	56730	2 1/4	57	2	51			A2, A3 or A10
H0256	55104			D0256	56731	2 5/16	59					
H0238	55105	X0238	55930	D0238	56732	2 3/8	60					
H0212	55106	X0212	55931	D0212	56733	2 1/2	64			2	51	A2, A3 or A10
H0296	55107			D0296	56734	2 9/16	65					
H0258	55108			D0258	56736	2 5/8	67	2 1/2	64			
H0234	55109	X0234	55932	D0234	56737	2 3/4	70					A2, A3 or A10
H0278	55110	X0278	55933	D0278	56738	2 7/8	73					
H0300	55111	X0300	55934	D0300	56739	3	76			2 1/2	64	
H0318	55112			D0318	56740	3 1/8	79					A2, A3 or A10
H0314	55113	X0314	55935	D0314	56741	3 1/4	83	3	76			
H0338	55114			D0338	56742	3 3/8	86					
H0312	55115	X0312	55936	D0312	56743	3 1/2	89			3	76	A2, A3 or A10
H0358	55116			D0358	56744	3 5/8	92					
H0334	55117			D0334	56745	3 3/4	95	3 1/2	89			
H0378	55118			D0378	56746	3 7/8	98					A2, A3 or A10
H0400	55119	X0400	55937	D0400	56747	4	102					
H0418	55120			D0418	56748	4 1/8	105			3 1/2	89	
H0414	55121			D0414	56749	4 1/4	108					A2, A3 or A10
H0438	55122			D0438	56750	4 3/8	111					
H0412	55123	X0412	55938	D0412	56751	4 1/2	114			4	102	
H0434	55124			D0434	56752	4 3/4	121					A2, A3 or A10
H0500	55125			D0500	56753	5	127					
H0512	55126			D0512	56754	5 1/2	140					
H0600	55127			D0600	56755	6	152					

Explanatory Notes

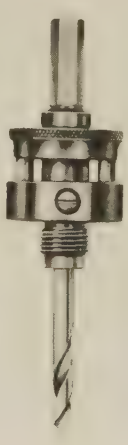
1. Carbide grit and Diamond hole saws require arbors with carbide tip drills. These arbors may be ordered by prefixing the above arbor numbers with "X".
2. *Pipe entrance* is the diameter of the hole through which piping of a given size will pass during installation or repair. *Pipe size* is designated by *inside diameter*. Referring to the table, a 7/8" diameter hole saw is used to prepare a hole through which 1/2" pipe may be passed.
3. *Tubing size* is designated by *outside diameter*. To prepare an entrance hole of a given tubing diameter, the same diameter hole saw should be used.
4. *Pipe Taps* listed are for threading holes prepared by hole sawing to receive threaded pipe. Example: referring to the table, you would select a 7/8" diameter hole saw to provide a proper hole for a 3/4" pipe tap.

Hole Saw Arbors

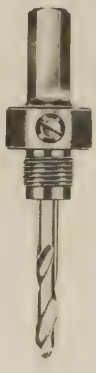
For Safe-Flex High Speed, Carbide Grit and Diamond Hole Saws

A1, A11 Arbors

A4 Arbor



A10 Quik-Hitch Arbor



A6 Arbor

A2 Quik-Hitch Arbor

A3 Quik-Hitch Arbor

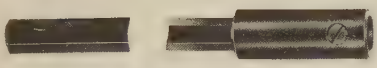
Seven models, each with 1/4" pilot drill. Set screw in body allows adjustment of pilot drill projection. Specify by catalog number to suit hole saw diameter. Quik-Hitch arbors permit instant change of hole saws without tools and without removing arbor from chuck. Arbor No. A4 supplied with flats to fit 5/8" wrench. In ordering arbors for carbide grit or diamond hole saws, specify X arbors with carbide tip pilot drills.

Cat. No. With H.S.S. Drill	EDP No.	Cat. No. With Carbide Drill	EDP No.	Fits Hole Saw Diameters	Screw Thread	Shank Size	Chuck Size	Fits Morse Taper Adapter
A1	55141	XA1	56758	9/16"–1 3/16" 14–30 mm	1/2-20	11/32" hex	3/8"	MA05, MA06
A4	55144	XA4	56761	9/16"–1 3/16" 14–30 mm	1/2-20	1/4" round	1/4"	—
A11	56655	XA11	56764	9/16"–1 3/16" 14–30 mm	1/2-20	7/16" hex	1/2"	MA02, MA03
A10	56615	XA10	56763	1 1/4"–6" 32–152 mm	5/8-18	11/32" hex	3/8"	MA05, MA06
A6*	55146	XA6*	56762	1 1/4"–1 1/2" 32–38 mm	5/8-18	7/16" hex	1/2"	MA02, MA03
A2	55142	XA2	56759	1 1/4"–6" 32–152 mm	5/8-18	7/16" hex	1/2"	MA02, MA03
A3	55143	XA3	56760	1 1/4"–6" 32–152 mm	5/8-18	5/8" hex	3/4"	MA04

*1" diameter body—passes through sawed hole

Packed one in a box.

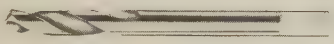
Hole Saw Accessories



12" ARBOR EXTENSIONS

Cat. No.	EDP No.	Fits
A5	55145	1/2" chuck; for A2, A6, A11 Arbors
A15	56651	3/8" chuck; for A1, A10 Arbors

Also fits equivalent X arbors.

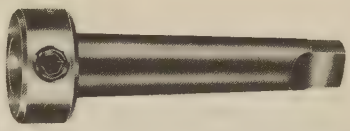


No. A014C (EDP No. 56616) Pilot Drill. 1/4" diameter, high speed steel. Held by set screw in arbor body. Fits all Starrett hole saw arbors except A4. Packed one in an envelope, 10 in a box.

No. XA014C (EDP No. 56617) Pilot Drill. 1/4" diameter, carbide tipped for arbors when used to drive carbide grit or diamond hole saws. Fits all Starrett hole saw arbors except A4. Packed one in an envelope, 10 in a box.

No. A014D (EDP No. 55147) Pilot Drill. 1/4" diameter, high speed steel. Held by set screw in arbor body. Fits A4 and all Starrett hole saw arbors with thru holes in hex shanks. Packed one in an envelope, 10 in a box.

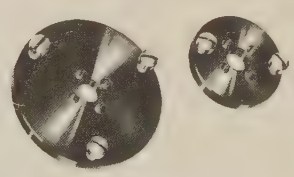
No. XA014D (EDP No. 55975) Pilot Drill. 1/4" diameter, carbide tipped. Held by set screw in arbor body. Fits A4 and all Starrett hole saw arbors with thru holes in hex shanks. Used to drive carbide grit or diamond hole saws. Packed one in an envelope, 10 in a box.



Morse Taper Adaptors — Used for fitting Starrett hole saw arbors to machine spindles with Morse tapers. Packed one in a box.

Cat. No.	EDP No.	Fits
MA02	55148	#2 Morse taper; for A2, A6, A11 Arbors
MA03	55149	#3 Morse taper; for A2, A6, A11 Arbors
MA04	55150	#3 Morse taper; for A3 Arbor
MA05	56652	#2 Morse taper; for A1, A10 Arbors
MA06	56653	#3 Morse taper; for A1, A10 Arbors

Also fits equivalent X arbors.



Drive plates should be used with all hole saws 3" and larger to prevent damage to the saw pin holes and thread. Packed one in a box.

Cat. No.	EDP No.	Fits
A8	56009	3" to 4-1/8" hole saws
A9	56010	4-1/4" to 6" hole saws

No. A7, (EDP No. 55151) Ejector Spring. Presses over pilot drill. Pushes core out of hole saw after cut. For use with regular hole saws only. Packed one in a box.

Suggested Speeds in RPM for Safe-Flex Hole Saws

Saw Diameter		Mild Steel	Tool and Stainless Steels	Cast Iron	Brass	Alumi-num
Inches	mm					
9/16	14	580	300	400	790	900
5/8	16	550	275	365	730	825
11/16	17	500	250	330	665	750
3/4	19	460	230	300	600	690
13/16	21	425	210	280	560	630
7/8	22	390	195	260	520	585
15/16	24	370	185	245	495	555
1	25	350	175	235	470	525
1-1/16	27	325	160	215	435	480
1-1/8	29	300	150	200	400	450
1-3/16	30	285	145	190	380	425
1-1/4	32	275	140	180	360	410
1-5/16	33	260	135	175	345	390
1-3/8	35	250	125	165	330	375
1-7/16	37	240	120	160	315	360
1-1/2	38	230	115	150	300	345
1-9/16	40	220	110	145	290	330
1-5/8	41	210	105	140	280	315
1-11/16	43	205	100	135	270	305
1-3/4	44	195	95	130	260	295
1-13/16	46	190	95	125	250	285
1-7/8	48	180	90	120	240	270
2	51	170	85	115	230	255
2-1/16	52	165	80	110	220	245
2-1/8	54	160	80	105	210	240
2-1/4	57	150	75	100	200	225
2-5/16	59	145	75	100	195	225
2-3/8	60	140	70	95	190	220
2-1/2	64	135	65	90	180	205
2-9/16	65	130	65	85	175	200
2-5/8	67	130	65	85	170	195
2-3/4	70	125	60	80	160	185
2-7/8	73	120	60	80	160	180
3	76	115	55	75	150	170
3-1/8	79	110	55	70	140	165
3-1/4	83	105	50	70	140	155
3-3/8	86	100	50	65	130	150
3-1/2	89	95	45	65	130	145
3-5/8	92	95	45	60	120	140
3-3/4	95	90	45	60	120	135
3-7/8	98	90	45	60	120	135
4	102	85	40	55	110	130
4-1/8	105	80	40	55	110	120
4-1/4	108	80	40	55	110	120
4-3/8	111	80	40	50	100	120
4-1/2	114	75	35	50	100	105
4-3/4	121	70	35	45	90	95
5	127	65	30	40	85	90
5-1/2	140	60	30	35	80	85
6	152	55	25	35	75	85

Starrett®

Precision Ground Flat Stock

Machine Parts ● Jigs ● Fixtures ● Parallels ● Dies
Test Tools ● Test Gages ● Flat Gages ● Shims
Punches ● Stamps ● Cutters ● Templates

Figure out what Starrett Precision Ground Flat Stock and Die Stock can save you in your shop . . . no more time lost hunting up stock . . . no more slow, costly grinding to size. Just lay it out and saw it out and save valuable machinery and man hours. Use it for all types of parts having two flat parallel surfaces.

Three Types. Select the best type to meet your specific needs. No. 496 is a non-deforming chromium, tungsten, vanadium oil hardening tool steel providing deep hardening characteristics and fine grain structure. No. 497 is a non-deforming 5% chromium air hardening steel having high wear and abrasion resistance and especially suited to long runs and close tolerances. No. 498 is a free machining, low carbon, silicon killed steel which can be carburized or case hardened.

Complete Range of Sizes. Starrett Precision Ground Flat stock numbers 496 (oil hardening) and 497 (air hardening) come in 18" and 36" lengths. Number 498 (low carbon) comes in 24" lengths. Available in thicknesses and widths to meet any requirement. Each piece is identified the full length of the bar—cannot be confused with other steels.

Precision Ground with Fine Finish. Starrett Precision Ground Flat Stock and Die Stock is ground straight and parallel. Standard thicknesses are within ±.001". Smooth finish (35 microinch or finer) insures accurate layout work.

Packaging. Starrett Precision Ground Flat Stock and Die Stock is individually wrapped, clearly marked with size dimensions, analysis and correct hardening and tempering information. Individual packaging assures quick identification, easy handling and maximum protection.

No. 496 Oil Hardening (Non-Deforming) Precision Ground Flat Stock

Starrett No. 496 Oil Hardening Flat Stock and Die Stock is made of non-deforming chromium, tungsten, vanadium electric furnace tool steel to rigid Starrett specifications.

Notice the low 1450°-1500°F hardening range that makes this steel easy to harden. Vanadium content assures fine grain which in turn provides high toughness. Every piece fully spheroidized annealed for uniform carbide size and easy machining.

Use No. 496 for all intricate work and work with thin sections; its non-deforming characteristics insure better work with minimum danger of cracking.

- ★ **Non-Deforming—Use It For The Most Intricate Work**
- ★ **Deep Hardening Characteristics and Fine Grain Structure**
- ★ **Machines Freely—Fully Spheroidized Annealed**
- ★ **Full Length Identification—Cannot Be Confused With Other Steels**
- ★ **The Starrett Company Uses Its Own Ground Flat Stock and Die Stock for Many of Its Precision Tool Parts**

Specifications

Furnished in 18 and 36 inch lengths, ground straight and parallel. Standard thicknesses are within ±.001". For complete table of sizes, see pages 488-490.

Nominal Analysis (AISI O1)

Carbon	.90	Chromium	.50
Manganese	1.20	Tungsten	.50
	Vanadium	.20	

Packaging

Each piece individually wrapped and clearly marked with size dimensions, analysis and correct hardening and tempering information. Individual packaging assures quick identification, easy handling, maximum protection of contents.

Hardening

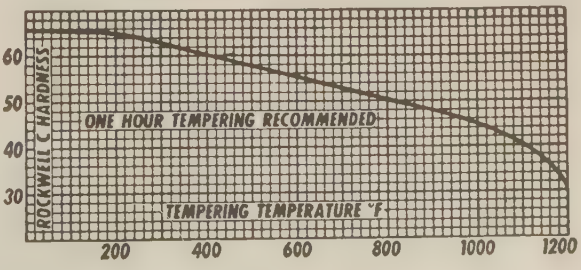
It is recommended that stock be heated uniformly to 1450°-1500°F and quenched in oil. Temperature of the quenching oil should be 120°-140°F for best results. Do not quench in water as this is an oil hardening steel.

Size	Temperature	Quench	Rockwell C
All Sizes	1450°-1500°F	Oil	64-66

Tempering

For maximum toughness, a tempering time of one hour at temperature is recommended. Use chart for selecting desired Rockwell C hardness and corresponding tempering temperature. The following table may also be used as a guide depending on type of work.

Cutting Tools
300°-350°F (Light Straw)
Solid Punches and Dies
400°-450°F (Straw)
Spring Temper
750°-800°F (Blue)



FOR COMPLETE LISTING OF SIZES, SEE PAGES 488-490

Specifications—Precision Ground Flat Stock—18 Inch Lengths

No. 496 Oil Hardening (Non-Deforming)

Thickness	Width and Length	EDP No.	Weight Per Piece
1/64"	1/2 x 18"	53924	.04 lbs
	3/4 x 18"	53925	.06 lbs
	1 x 18"	53926	.08 lbs
	1 1/4 x 18"	53927	.10 lbs.
	1 1/2 x 18"	53928	.12 lbs
	2 x 18"	53929	.16 lbs.
	2 1/2 x 18"	53930	.21 lbs.
	3 x 18"	53931	.26 lbs.
	4 x 18"	53932	.34 lbs
1/32"	1/2 x 18"	53933	.08 lbs.
	3/4 x 18"	53934	.12 lbs.
	1 x 18"	53935	.16 lbs
	1 1/4 x 18"	53936	.21 lbs.
	1 1/2 x 18"	53937	.25 lbs.
	2 x 18"	53938	.33 lbs
	2 1/2 x 18"	53939	.40 lbs.
	3 x 18"	53940	.51 lbs.
	4 x 18"	53941	.63 lbs.
	6 x 18"	53942	.96 lbs.
3/64"	1/2 x 18"	53943	.12 lbs.
	3/4 x 18"	53944	.18 lbs.
	1 x 18"	53945	.24 lbs.
	1 1/4 x 18"	53946	.30 lbs.
	1 1/2 x 18"	53947	.36 lbs
	2 x 18"	53948	.48 lbs.
	2 1/2 x 18"	53949	.60 lbs
	3 x 18"	53950	.72 lbs.
	3 1/2 x 18"	53951	.84 lbs.
	4 x 18"	53952	.95 lbs.
	6 x 18"	53953	1.43 lbs.
1/16"	1/2 x 18"	53954	.16 lbs.
	3/4 x 18"	53955	.24 lbs.
	1 x 18"	53956	.32 lbs.
	1 1/4 x 18"	53957	.39 lbs.
	1 1/2 x 18"	53958	.48 lbs.
	1 3/4 x 18"	53959	.56 lbs.
	2 x 18"	53960	.63 lbs.
	2 1/2 x 18"	53961	.80 lbs.
	3 x 18"	53962	.95 lbs.
	3 1/2 x 18"	53963	1.12 lbs.
	4 x 18"	53964	1.25 lbs.
	5 x 18"	53965	1.59 lbs.
	6 x 18"	53966	1.90 lbs.
	8 x 18"	53967	2.53 lbs.
	10 x 18"	53968	3.18 lbs.
5/64"	1/2 x 18"	53969	.20 lbs.
	3/4 x 18"	53970	.30 lbs.
	1 x 18"	53971	.40 lbs.
	1 1/2 x 18"	53972	.60 lbs.
	2 x 18"	53973	.80 lbs.
	2 1/2 x 18"	53974	1.00 lbs.
	3 x 18"	53975	1.19 lbs.
	4 x 18"	53976	1.59 lbs.
	6 x 18"	53977	2.39 lbs.
3/32"	1/2 x 18"	53978	.24 lbs.
	3/4 x 18"	53979	.35 lbs.
	1 x 18"	53980	.48 lbs.
	1 1/4 x 18"	53981	.60 lbs.
	1 1/2 x 18"	53982	.73 lbs.
	2 x 18"	53983	.97 lbs.
	2 1/2 x 18"	53984	1.18 lbs.
	3 x 18"	53985	1.44 lbs.
	4 x 18"	53986	1.92 lbs.
	5 x 18"	53987	2.37 lbs
	6 x 18"	53988	2.87 lbs.
	8 x 18"	53989	3.83 lbs.
7/64"	1/2 x 18"	53990	.28 lbs.
	3/4 x 18"	53991	.42 lbs.
	1 x 18"	53992	.56 lbs.
	1 1/4 x 18"	53993	.70 lbs.
	1 1/2 x 18"	53994	.84 lbs.
	2 x 18"	53995	1.12 lbs.
	3 x 18"	53996	1.67 lbs.
	4 x 18"	53997	2.23 lbs.
1/8"	1/4 x 18"	53998	.08 lbs.
	1/2 x 18"	53999	.32 lbs.
	5/8 x 18"	54000	.40 lbs.
	3/4 x 18"	54001	.40 lbs.
	1 x 18"	54002	.64 lbs.
	1 1/4 x 18"	54003	.80 lbs.
	1 1/2 x 18"	54004	.95 lbs.
	1 3/4 x 18"	54005	1.12 lbs.
	2 x 18"	54006	1.29 lbs.
	2 1/2 x 18"	54007	1.59 lbs.
	3 x 18"	54008	1.91 lbs.
	3 1/2 x 18"	54009	2.22 lbs.
	4 x 18"	54010	2.58 lbs.
	4 1/2 x 18"	54011	2.90 lbs.
	5 x 18"	54012	3.20 lbs.
	6 x 18"	54013	3.80 lbs.
	7 x 18"	54014	4.47 lbs.
	8 x 18"	54015	5.06 lbs.
	10 x 18"	54016	6.33 lbs.
	12 x 18"	54017	7.60 lbs.
9/64"	9/64 x 18"	54019	.10 lbs.
	1/2 x 18"	54020	.36 lbs.
	3/4 x 18"	54021	.57 lbs.
	1 x 18"	54022	.72 lbs
	1 1/2 x 18"	54023	1.08 lbs.
	2 x 18"	54024	1.43 lbs.
	3 x 18"	54025	2.15 lbs.
	4 x 18"	54026	2.87 lbs.
5/32"	5/32 x 18"	54027	.12 lbs.
	1/2 x 18"	54028	.43 lbs.
	3/4 x 18"	54029	.61 lbs.
	1 x 18"	54030	.79 lbs.
	1 1/4 x 18"	54031	1.00 lbs.
	1 1/2 x 18"	54032	1.20 lbs.
	1 3/4 x 18"	54033	1.39 lbs.
	2 x 18"	54034	1.61 lbs.
	2 1/2 x 18"	54035	2.01 lbs.
	3 x 18"	54036	2.38 lbs.
	3 1/2 x 18"	54037	2.75 lbs.
	4 x 18"	54038	3.16 lbs.
	5 x 18"	54039	4.02 lbs.
	6 x 18"	54040	4.74 lbs.
3/16"	3/16 x 18"	54042	.19 lbs.
	1/2 x 18"	54043	.48 lbs.
	3/4 x 18"	54044	.72 lbs.
	1 x 18"	54045	.95 lbs.
	1 1/4 x 18"	54046	1.19 lbs.
	1 1/2 x 18"	54047	1.44 lbs.
	1 3/4 x 18"	54048	1.67 lbs.
	2 x 18"	54049	1.91 lbs.
	2 1/2 x 18"	54050	2.40 lbs.
	3 x 18"	54051	2.87 lbs.
	3 1/2 x 18"	54052	3.35 lbs.
	4 x 18"	54053	3.82 lbs.
	5 x 18"	54054	4.82 lbs.
	6 x 18"	54055	5.76 lbs.
	8 x 18"	54056	7.68 lbs.
	10 x 18"	54057	9.60 lbs.
7/32"	7/32 x 18"	54058	.28 lbs.
	1/2 x 18"	54059	.56 lbs.
	3/4 x 18"	54060	.84 lbs.
	1 x 18"	54061	1.12 lbs.
	1 1/4 x 18"	54062	1.40 lbs.
	1 1/2 x 18"	54063	1.67 lbs.
	2 x 18"	54064	2.24 lbs.
	3 x 18"	54065	3.35 lbs.
	4 x 18"	54066	4.48 lbs.
	6 x 18"	54067	6.70 lbs.
1/4"	1/4 x 18"	54068	.32 lbs.
	5/16 x 18"	54069	.50 lbs.
	1/2 x 18"	54070	.64 lbs.
	3/4 x 18"	54071	.95 lbs.
	1 x 18"	54072	1.27 lbs.
	1 1/4 x 18"	54073	1.60 lbs.
	1 1/2 x 18"	54074	1.92 lbs.
	1 3/4 x 18"	54075	2.23 lbs.
	2 x 18"	54076	2.55 lbs.
	2 1/2 x 18"	54077	3.19 lbs.
	3 x 18"	54078	3.82 lbs.
	3 1/2 x 18"	54079	4.47 lbs.
	4 x 18"	54080	4.91 lbs.
	4 1/2 x 18"	54081	5.65 lbs.
	5 x 18"	54082	6.38 lbs.
	5 1/2 x 18"	54083	6.92 lbs.
	6 x 18"	54084	7.46 lbs.
	7 x 18"	54085	8.93 lbs.
	8 x 18"	54086	9.94 lbs.
	10 x 18"	54087	12.43 lbs.
	12 x 18"	54088	14.92 lbs.
	14 x 18"	54089	17.86 lbs.
9/32"	9/32 x 18"	54090	.40 lbs.
	1/2 x 18"	54091	.72 lbs.
	3/4 x 18"	54092	1.08 lbs.
	1 x 18"	54093	1.43 lbs.
	1 1/4 x 18"	54094	1.79 lbs.
	1 1/2 x 18"	54095	2.15 lbs.
	2 x 18"	54096	2.87 lbs.
	2 1/2 x 18"	54097	3.69 lbs.
	3 x 18"	54098	4.30 lbs.
	4 x 18"	54099	5.74 lbs.
	6 x 18"	54100	8.60 lbs.
5/16"	5/16 x 18"	54101	.49 lbs.
	1/2 x 18"	54102	.80 lbs.
	3/4 x 18"	54103	1.21 lbs
	1 x 18"	54104	1.64 lbs.
	1 1/4 x 18"	54105	2.00 lbs.
	1 1/2 x 18"	54106	2.37 lbs.
	2 x 18"	54107	3.20 lbs.
	2 1/2 x 18"	54108	4.00 lbs.
	3 x 18"	54109	4.74 lbs.
	3 1/2 x 18"	54110	5.58 lbs.
	4 x 18"	54111	6.41 lbs.
	4 1/2 x 18"	54112	7.18 lbs.
	5 x 18"	54113	7.94 lbs
	6 x 18"	54114	9.48 lbs
	8 x 18"	54115	12.64 lbs
3/8"	3/8 x 18"	54116	.71 lbs.
	1/2 x 18"	54117	.96 lbs.
	3/4 x 18"	54118	1.44 lbs
	1 x 18"	54119	1 90 lbs
	1 1/4 x 18"	54120	2.38 lbs
	1 1/2 x 18"	54121	2 86 lbs.
	1 3/4 x 18"	54122	3 35 lbs
	2 x 18"	54123	3.84 lbs

(Continued on next page)

Specifications—Precision Ground Flat Stock—18 Inch Lengths (Cont.)

No. 496 Oil Hardening (Non-Deforming)

Thickness	Width and Length	EDP No.	Weight Per Piece
3/8"	2½x18"	54124	4.76 lbs.
	3 x18"	54125	5.72 lbs.
	3½x18"	54126	6.70 lbs
	4 x18"	54127	7.67 lbs.
	4½x18"	54128	8.60 lbs.
	5 x18"	54129	9.52 lbs.
	6 x18"	54131	11.44 lbs.
	7 x18"	54132	13.34 lbs.
	8 x18"	54133	15.25 lbs.
	10 x18"	54134	19.06 lbs.
	12 x18"	54135	22.87 lbs.
7/16"	7/16x18"	54136	.98 lbs.
	½x18"	54137	1.12 lbs
	¾x18"	54138	1.68 lbs.
	1 x18"	54139	2.24 lbs.
	1¼x18"	54140	2.80 lbs.
	1½x18"	54141	3.34 lbs.
	2 x18"	54142	4.48 lbs.
	2½x18"	54143	5.54 lbs.
	3 x18"	54144	6.70 lbs.
	4 x18"	54145	8.96 lbs.
	6 x18"	54146	13.40 lbs.
1/2"	½x18"	54147	1.29 lbs.
	5/8x18"	54148	1.66 lbs.
	¾x18"	54149	1.92 lbs.
	1 x18"	54150	2.54 lbs.
	1¼x18"	54151	3.20 lbs.
	1½x18"	54152	3.83 lbs.
	2 x18"	54153	5.09 lbs.
	2½x18"	54154	6.36 lbs.
	3 x18"	54155	7.56 lbs.
	3½x18"	54156	8.87 lbs.
	4 x18"	54157	10.16 lbs.
	4½x18"	54158	11 41 lbs
	5 x18"	54159	12.65 lbs.
	6 x18"	54160	15.14 lbs.
	7 x18"	54161	17.64 lbs.
	8 x18"	54162	20.16 lbs.
	10 x18"	54163	25.20 lbs.
	12 x18"	54164	30.24 lbs.
9/16"	9/16x18"	54166	1.61 lbs.
	¾x18"	54167	2.15 lbs.
	1 x18"	54168	2.87 lbs.
	1¼x18"	54169	3.59 lbs.
	1½x18"	54170	4.30 lbs.
	2 x18"	54171	5.74 lbs.
5/8"	5/8x18"	54172	1.99 lbs.
	¾x18"	54173	2.40 lbs.
	1 x18"	54174	3.28 lbs.
	1¼x18"	54175	4.06 lbs.
	1½x18"	54176	4.84 lbs.
	2 x18"	54177	6.40 lbs.
	2½x18"	54178	7.94 lbs.
	3 x18"	54179	9.48 lbs.
	3½x18"	54180	11.15 lbs.
	4 x18"	54181	12.82 lbs.
	5 x18"	54182	15.58 lbs.
	6 x18"	54183	18.96 lbs.
3/4"	¾x18"	54187	2.88 lbs.
	1 x18"	54188	3.84 lbs.
	1¼x18"	54189	4.80 lbs.
	1½x18"	54190	5.76 lbs.
	2 x18"	54191	7.68 lbs.
	2½x18"	54192	9.56 lbs.
	3 x18"	54193	11.44 lbs.
	3½x18"	54194	13.40 lbs.
	4 x18"	54195	15.36 lbs.
	4½x18"	54196	17.24 lbs.
	5 x18"	54197	19.12 lbs.
	6 x18"	54198	22.88 lbs.
	8 x18"	54199	30.50 lbs.
7/8"	7/8x18"	54202	3.94 lbs.
	1 x18"	54203	4.80 lbs.
	1¼x18"	54204	5.60 lbs.
	1½x18"	54205	6.69 lbs.
	2 x18"	54206	8 96 lbs.
	2½x18"	54207	11.15 lbs.
	3 x18"	54208	13.35 lbs.
	4 x18"	54209	17.92 lbs.
	6 x18"	54210	26.70 lbs.
1"	1 x18"	54211	5.00 lbs.
	1¼x18"	54212	6.28 lbs.
	1½x18"	54213	7.56 lbs.
	2 x18"	54214	10.18 lbs.
	2½x18"	54215	12.65 lbs.
	3 x18"	54216	15.12 lbs.
	3½x18"	54217	17.72 lbs.
	4 x18"	54218	20.32 lbs.
	5 x18"	54220	25.28 lbs.
	6 x18"	54221	30.24 lbs.
	8 x18"	54222	40.64 lbs.
	12 x18"	54224	60.67 lbs.
1 1/8"	1½x18"	54225	8.56 lbs.
	2 x18"	54226	11.45 lbs.
1 1/4"	1¼x18"	54230	7.95 lbs.
	1½x18"	54231	9.54 lbs.
	2 x18"	54232	12.73 lbs.
	2½x18"	54233	15.89 lbs.
	3 x18"	54234	19.06 lbs.
	4 x18"	54235	25.40 lbs.
1 1/2"	1½x18"	54240	11.50 lbs.
	2 x18"	54241	15.30 lbs.
	2½x18"	54242	19.10 lbs.
	3 x18"	54243	23.00 lbs.
	3½x18"	54244	26 80 lbs.
	4 x18"	54245	30.60 lbs.
2"	2 x18"	54250	20.40 lbs.
	3 x18"	54251	30.60 lbs.
	4 x18"	54252	40.80 lbs.

Prices on application for other lengths, widths, and thicknesses.

Specifications—Precision Ground Flat Stock—36 Inch Lengths

No. 496 Oil Hardening (Non-Deforming)

Thickness	Width and Length	EDP No.	Weight Per Piece
1/16"	1/2 x36"	54257	.32 lbs.
	3/4 x36"	54258	48 lbs
	1 x36"	54259	64 lbs
	1 1/4 x36"	54260	78 lbs
	1 1/2 x36"	54261	96 lbs
	1 3/4 x36"	54262	1 12 lbs
	2 x36"	54263	1 26 lbs
	2 1/2 x36"	54264	1 60 lbs
	3 x36"	54265	1 90 lbs
	3 1/2 x36"	54266	2 24 lbs
	4 x36"	54267	2 50 lbs
	5 x36"	54268	3 18 lbs
	6 x36"	54269	3 80 lbs
3/32"	1/2 x36"	54279	48 lbs
	3/4 x36"	54280	70 lbs
	1 x36"	54281	96 lbs
	1 1/4 x36"	54282	1 20 lbs
	1 1/2 x36"	54283	1 46 lbs
	2 x36"	54284	1 94 lbs
	2 1/2 x36"	54285	2 36 lbs.
	3 x36"	54286	2 88 lbs
	4 x36"	54287	3 84 lbs
	5 x36"	54288	4 74 lbs
	6 x36"	54289	5 74 lbs
1/8"	1/2 x36"	54298	64 lbs
	5/8 x36"	54299	80 lbs
	3/4 x36"	54300	96 lbs
	1 x36"	54301	1 28 lbs
	1 1/4 x36"	54302	1 60 lbs
	1 1/2 x36"	54303	1 90 lbs
	1 3/4 x36"	54304	2 24 lbs
	2 x36"	54305	2.58 lbs.
	2 1/2 x36"	54306	3 18 lbs
	3 x36"	54307	3 82 lbs.
	3 1/2 x36"	54308	4 44 lbs
	4 x36"	54309	5.16 lbs
	4 1/2 x36"	54310	5 80 lbs
	5 x36"	54311	6 40 lbs
	6 x36"	54312	7 60 lbs
	7 x36"	54313	8 94 lbs
	8 x36"	54314	10 32 lbs
5/32"	1/2 x36"	54324	80 lbs.
	3/4 x36"	54325	1 21 lbs
	1 x36"	54326	1.64 lbs
	1 1/4 x36"	54327	2 00 lbs
	1 1/2 x36"	54328	2 37 lbs
	1 3/4 x36"	54329	2 85 lbs
	2 x36"	54330	3 20 lbs
	2 1/2 x36"	54331	4 00 lbs
	3 x36"	54332	4.74 lbs
	3 1/2 x36"	54333	5 54 lbs
	4 x36"	54334	6.41 lbs
	5 x36"	54335	8.00 lbs
	6 x36"	54336	9 48 lbs
	8 x36"	54337	12 82 lbs
3/16"	1/2 x36"	54338	96 lbs
	3/4 x36"	54339	1 44 lbs
	1 x36"	54340	1 90 lbs
	1 1/4 x36"	54341	2.38 lbs
	1 1/2 x36"	54342	2 88 lbs
	1 3/4 x36"	54343	3 34 lbs
	2 x36"	54344	3.82 lbs.
	2 1/2 x36"	54345	4.80 lbs.
	3 x36"	54346	5 74 lbs
	4 x36"	54348	7.64 lbs.
	6 x36"	54350	11.52 lbs.
7/32"	1/2 x36"	54353	1.12 lbs.
	3/4 x36"	54354	1.68 lbs.
	1 x36"	54355	2.24 lbs
	1 1/4 x36"	54356	2.80 lbs
	1 1/2 x36"	54357	3.34 lbs.
	2 x36"	54358	4.48 lbs.
	3 x36"	54359	6 68 lbs.
	4 x36"	54360	8.96 lbs
1/4"	1/4 x36"	56517	.64 lbs
	1/2 x36"	54362	1.28 lbs.
	3/4 x36"	54363	1.90 lbs.
	1 x36"	54364	2.54 lbs.
	1 1/4 x36"	54365	3.20 lbs
	1 1/2 x36"	54366	3.84 lbs
	1 3/4 x36"	54367	4.46 lbs
	2 x36"	54368	5.10 lbs
	2 1/2 x36"	54369	6.38 lbs.
	3 x36"	54370	7.64 lbs.
	3 1/2 x36"	54371	8.94 lbs.
	4 x36"	54372	9.82 lbs.
	5 x36"	54374	12 76 lbs
	6 x36"	54376	14.92 lbs.
5/16"	1/4 x36"	54391	1.00 lbs
	1/2 x36"	54392	1 60 lbs.
	3/4 x36"	54393	2.42 lbs
	1 x36"	54394	3.28 lbs
	1 1/4 x36"	54395	4 00 lbs.
	1 1/2 x36"	54396	4 74 lbs.
	2 x36"	54397	6 40 lbs
	2 1/2 x36"	54398	8.00 lbs
	3 x36"	54399	9 48 lbs
	4 x36"	54401	12 82 lbs
	5 x36"	54403	16 00 lbs
	6 x36"	54404	18 96 lbs
3/8"	1/8 x36"	54406	1.44 lbs.
	1/2 x36"	54407	1.92 lbs.
	3/4 x36"	54408	2.88 lbs.
	1 x36"	54409	3.80 lbs
	1 1/4 x36"	54410	4.76 lbs
	1 1/2 x36"	54411	5.72 lbs
	1 3/4 x36"	54412	6.68 lbs
	2 x36"	54413	7.68 lbs.
	2 1/2 x36"	54414	9.52 lbs
	3 x36"	54415	11 44 lbs
	4 x36"	54417	15.34 lbs
	5 x36"	54419	19 04 lbs.
	6 x36"	54421	22 88 lbs.
	8 x36"	54423	30 50 lbs
7/16"	7/16 x36"	54426	3 94 lbs
	1/2 x36"	54427	2 24 lbs
	3/4 x36"	54428	3 36 lbs
	1 x36"	54429	4 48 lbs.
	1 1/4 x36"	54430	5.60 lbs.
	1 1/2 x36"	54431	6.68 lbs.
	2 x36"	54432	8.96 lbs.
	3 x36"	54434	13 36 lbs.
	4 x36"	54435	17.92 lbs.
	6 x36"	54436	26.72 lbs.
1/2"	1/2 x36"	54437	2.58 lbs
	5/8 x36"	54438	3.32 lbs
	3/4 x36"	54439	3.84 lbs.
	1 x36"	54440	5.08 lbs.
	1 1/4 x36"	54441	6.40 lbs.
	1 1/2 x36"	54442	7.66 lbs
	2 x36"	54443	10 18 lbs.
	2 1/2 x36"	54444	12.72 lbs
	3 x36"	54445	15 12 lbs
	4 x36"	54447	20 32 lbs
	5 x36"	54449	25.30 lbs.
	6 x36"	54450	30 28 lbs.
	8 x36"	54452	40.32 lbs.
	10 x36"	54453	50.40 lbs.
5/8"	5/8 x36"	54461	3.98 lbs.
	3/4 x36"	54462	4.84 lbs.
	1 x36"	54463	6.56 lbs.
	1 1/4 x36"	54464	8.12 lbs.
	1 1/2 x36"	54465	9.68 lbs.
	2 x36"	54466	12.80 lbs.
	2 1/2 x36"	54467	15.88 lbs.
	3 x36"	54468	18.96 lbs.
	4 x36"	54470	25.64 lbs.
	5 x36"	54471	31.76 lbs.
	6 x36"	54472	37.92 lbs.
3/4"	3/4 x36"	54476	5.76 lbs.
	1 x36"	54477	7.68 lbs.
	1 1/2 x36"	54479	11.48 lbs.
	2 x36"	54480	15.36 lbs.
	2 1/2 x36"	54481	19.12 lbs.
	3 x36"	54482	22.88 lbs.
	4 x36"	54484	30.72 lbs.
	6 x36"	54487	45.76 lbs.
7/8"	7/8 x36"	54491	7.88 lbs.
	1 1/2 x36"	54494	13.38 lbs.
	2 x36"	54495	17.92 lbs.
	2 1/2 x36"	54496	22.30 lbs.
1"	1 x36"	54500	10.00 lbs.
	1 1/2 x36"	54502	15.12 lbs.
	2 x36"	54503	20.36 lbs.
	2 1/2 x36"	54504	25.30 lbs.
	3 x36"	54505	30.24 lbs.
	4 x36"	54507	40.64 lbs
	6 x36"	54510	60.48 lbs.
1 1/4"	1 1/4 x36"	54519	15.90 lbs.
	1 1/2 x36"	54520	19.08 lbs.
	2 x36"	54521	25.46 lbs.
	4 x36"	54524	50.80 lbs.
	6 x36"	54526	76.39 lbs.
1 1/2"	1 1/2 x36"	54529	23.00 lbs.
	2 x36"	54530	30.60 lbs.
	2 1/2 x36"	54531	38.20 lbs.
	3 x36"	54532	46.00 lbs.
	4 x36"	54534	31.20 lbs.
	6 x36"	54536	92.00 lbs.
2"	2 x36"	54539	40 72 lbs
	3 x36"	54540	60 48 lbs
	4 x36"	54541	81.44 lbs
	6 x36"	54542	120.96 lbs

Flat Ground Die Steel in 36" lengths is square on both edges only.
Ends furnished saw cut in 36 1/8" lengths to allow for cutting.
NOTE: Prices on application for other lengths, widths, and thicknesses.

No. 497 Air Hardening (Non-Deforming) Precision Ground Flat Stock

- ★ 5% Chrome—Free Machining
- ★ 35% Better Machinability Than Regular A2 Air Hardening Steel
- ★ Non-Deforming—Maintains Close Dimensional Accuracy Throughout Heat Treating Process
- ★ Fool-Proof Hardening Because of Wide 100° Hardening Range
- ★ Ideal for Punches and Dies for Long-Production Runs, on Abrasive Materials and Similar Work
- ★ Full Length Identification—Cannot Be Confused With Other Steels
- ★ The Starrett Company Uses Its Own Ground Flat Stock and Die Stock for Many of Its Precision Tool Parts

Made to a special analysis for hardening in air and because of its non-deforming characteristics closely maintains accuracy of dimension throughout the heat treatment process. By eliminating distortion and cracking, costly rejects are eliminated and the cost of grinding to final size is substantially reduced.

Five per cent chromium content in Starrett No. 497 Air Hardening Precision Ground Die Stock makes this steel especially desirable for punches and dies to be used in long production runs since it gives tools far longer life. Up to 50% more pieces per sharpening can be produced than with oil hardening steel. The 5% chromium content also gives No. 497 high wear resistance and therefore this steel is ideal for punches and dies to stamp silicon and stainless steels, monel metal and other types of abrasive material.

(Continued next column)

Tempering

A tempering time of two hours at temperature is recommended. Use chart for selecting desired Rockwell C hardness and corresponding tempering temperature. For maximum toughness, double temper for two hours at each temperature recommended. The following table may also be used as a guide, depending on type of work.

Light Blanking Punches and Dies 400°-425°F

Heavy Blanking Punches and Dies 700°F

ANNEALING—1525°-1575°F. Furnace cool at not more than 50° per hour to 800° for maximum softness.

The special analysis insures good hardening properties. Fully spheroidized annealed for excellent machinability. Because of its air hardening properties and the wide 1700°-1800°F. range, hardening is practically fool proof.

Specifications

Furnished in 18 and 36 inch lengths, ground straight and parallel. Standard thicknesses are within ±.001". For complete sizes, see next page.

Nominal Analysis (AISI A2)

Carbon	1.00	Chromium	5.25
Manganese	.60	Molybdenum	1.00
Silicon	.40	Vanadium	.25

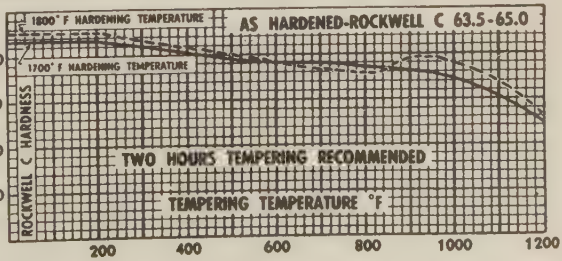
Packaging

Each piece individually wrapped and clearly marked with size dimensions, analysis and correct hardening and tempering information.

Hardening

No. 497 Air Hardening Precision Ground Die Stock has a wide hardening range of 1700° to 1800°F with 1750°F recommended for most work. For the heavier sections use the high side of the range. Heat uniformly throughout but do not soak longer than necessary. Cool in still air. No pre-heat is required if pack or atmosphere controlled furnace methods are used, but with the open furnace method a pre-heat of 1450°F is recommended.

Size	Temperature	Cool	Rockwell C
All Sizes	1700°-1800°F	Still Air	63.5-65



FOR COMPLETE LISTING OF SIZES, SEE NEXT PAGE

Specifications—Precision Ground Flat Stock—18 Inch Lengths

No. 497 Air Hardening (Non-Deforming)

Thickness	Width and Length	EDP No.	Weight Per Piece
1/8"	1 x18"	54589	.08 lbs
	1¼x18"	54590	.80 lbs.
	1½x18"	54591	1.12 lbs.
	2 x18"	54592	1.29 lbs.
	2½x18"	54593	1 59 lbs.
	3 x18"	54594	1.91 lbs.
	3½x18"	54595	2.22 lbs.
	4 x18"	54596	2.58 lbs.
	5 x18"	54598	3 20 lbs.
	6 x18"	54599	3.80 lbs.
5/32"	1 x18"	54600	.79 lbs.
	1½x18"	54602	1.20 lbs.
	2 x18"	54603	1.61 lbs.
	3 x18"	54605	2.38 lbs.
	4 x18"	54607	3.16 lbs.
	6 x18"	54609	4.74 lbs.
3/16"	1 x18"	54610	.95 lbs.
	1¼x18"	54611	1.19 lbs.
	1½x18"	54612	1 44 lbs.
	2 x18"	54613	1.91 lbs.
	2½x18"	54614	2.40 lbs.
	3 x18"	54615	2.87 lbs.
	4 x18"	54617	3.82 lbs.
	6 x18"	54619	5.76 lbs.
1/4"	1 x18"	54620	1.27 lbs.
	1¼x18"	54621	1.60 lbs.
	1½x18"	54622	1.92 lbs.
	2 x18"	54623	2.55 lbs.
	2½x18"	54624	3.19 lbs.
	3 x18"	54625	3.82 lbs.
	4 x18"	54627	4.91 lbs.
	5 x18"	54629	6.38 lbs.
	6 x18"	54631	7.46 lbs.
5/16"	1 x18"	54717	1.64 lbs.
	1¼x18"	54718	2.00 lbs.
	1½x18"	54719	2.37 lbs.
	2 x18"	54720	3.20 lbs.
	3 x18"	54722	4.74 lbs.
	4 x18"	54724	6.41 lbs.
	5 x18"	54726	7.94 lbs.
	6 x18"	54727	9.48 lbs.
3/8"	1 x18"	54728	1.90 lbs.
	1¼x18"	54729	2.38 lbs.
	1½x18"	54730	2.86 lbs.
	2 x18"	54731	3.84 lbs.
	2½x18"	54732	4.76 lbs.
	3 x18"	54733	5.72 lbs.
	3½x18"	54734	6.70 lbs.
	4 x18"	54735	7.67 lbs.
	5 x18"	54737	9.52 lbs.
	6 x18"	54739	11.44 lbs.
1/2"	½x18"	56495	1.29 lbs.
	¾x18"	56494	1.92 lbs.
	1 x18"	56493	2.54 lbs.
	2 x18"	54748	5.09 lbs.
	2½x18"	54749	6.36 lbs.
	3 x18"	54750	7.56 lbs.
	3½x18"	54751	8.87 lbs.
	4 x18"	54752	10.16 lbs.
	5 x18"	54754	11.41 lbs.
	6 x18"	54755	15.14 lbs.
	8 x18"	54757	20.16 lbs.
5/8"	⅝x18"	56499	1.99 lbs.
	¾x18"	56498	2.40 lbs.
	1 x18"	56497	3.28 lbs.
	1½x18"	56496	4.84 lbs.
	2 x18"	54760	6.40 lbs.
	2½x18"	54761	7.94 lbs.
	3 x18"	54762	9.48 lbs.
	3½x18"	54763	11.15 lbs.
	6 x18"	54766	18.96 lbs.
3/4"	¾x18"	54770	2.88 lbs.
	1 x18"	56501	3.84 lbs.
	1½x18"	56500	5.76 lbs.
	2 x18"	54771	7.68 lbs.
	3 x18"	54773	11.44 lbs.
	4 x18"	54775	15.38 lbs.
	6 x18"	54778	22.88 lbs.
7/8"	⅞x18"	54781	3.94 lbs.
	1 x18"	56503	4.80 lbs.
	1½x18"	56502	6.69 lbs.
	2 x18"	54782	8.96 lbs.
	3 x18"	54784	13.35 lbs.
	4 x18"	54785	17.92 lbs.
	6 x18"	54786	26.70 lbs.
1"	1 x18"	54787	5.00 lbs.
	1½x18"	56504	7.56 lbs.
	2 x18"	54788	10.18 lbs.
	2½x18"	56789	12.65 lbs.
	3 x18"	54790	15.12 lbs.
	4 x18"	54792	20.32 lbs.
	5 x18"	54794	25.28 lbs.
	6 x18"	54795	30.24 lbs.

Flat Ground Die Steel in 18" lengths is square on both edges only.
Ends furnished Saw cut in 18 3/16" and 36 1/8" lengths to allow for cutting.
NOTE: Prices on aplication for other lengths, widths, and thicknesses.

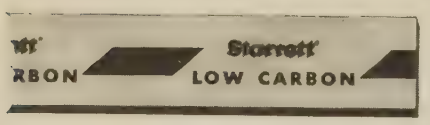
Specifications—Precision Ground Flat Stock—36 Inch Lengths

No. 497 Air Hardening (Non-Deforming)

Thickness	Width and Length	EDP No.	Weight Per Piece
1/8"	1 x36"	54546	1.28 lbs.
	1¼x36"	54547	1.60 lbs.
	1½x36"	54548	1.90 lbs.
	2 x36"	54549	2.58 lbs.
	2½x36"	54550	3.18 lbs.
	3 x36"	54551	3.82 lbs.
	3½x36"	54552	4.44 lbs
	4 x36"	54553	5.16 lbs.
	5 x36"	54555	6.40 lbs.
	6 x36"	54556	7.60 lbs
5/32"	1 x36"	54557	1 58 lbs.
	1½x36"	54559	2 40 lbs.
	2 x36"	54560	3.22 lbs
	3 x36"	54562	4 76 lbs
	4 x36"	54564	6.32 lbs.
	6 x36"	54566	9.52 lbs
3/16"	1 x36"	54567	1.90 lbs.
	1¼x36"	54568	2.38 lbs.
	1½x36"	54569	2.88 lbs
	2 x36"	54570	3.82 lbs
	2½x36"	54571	4.80 lbs
	3 x36"	54572	5.74 lbs
	4 x36"	54574	7.64 lbs
	6 x36"	54576	11 52 lbs
1/4"	1 x36"	54577	2.54 lbs.
	1¼x36"	54578	3.20 lbs.
	1½x36"	54579	3.84 lbs.
	2 x36"	54580	5.10 lbs.
	2½x36"	54581	6.38 lbs.
	3 x36"	54582	7.64 lbs
	4 x36"	54584	9 82 lbs
	5 x36"	54586	12.76 lbs.
	6 x36"	54588	15.28 lbs.
5/16"	1 x36"	54632	1.90 lbs.
	1¼x36"	54633	2.38 lbs.
	1½x36"	54634	2.88 lbs.
	2 x36"	54635	3.82 lbs.
	3 x36"	54637	5.74 lbs.
	4 x36"	54639	7.64 lbs.
	5 x36"	54641	9.60 lbs
	6 x36"	54642	11 52 lbs.
3/8"	1 x36"	54643	3.80 lbs.
	1¼x36"	54644	4.76 lbs.
	1½x36"	54645	5.72 lbs.
	2 x36"	54646	7.68 lbs.
	2½x36"	54647	9 52 lbs.
	3 x36"	54648	11 44 lbs.
	3½x36"	54649	13.40 lbs
	4 x36"	54650	15.34 lbs.
	5 x36"	54652	19.04 lbs.
	6 x36"	54654	22.88 lbs.
1/2"	½x36"	56505	2.58 lbs.
	¾x36"	56506	3.84 lbs.
	1 x36"	56507	5.08 lbs.
	2 x36"	54663	10.18 lbs.
	2½x36"	54664	12.72 lbs.
	3 x36"	54665	15.12 lbs.
	3½x36"	54666	17.70 lbs.
	4 x36"	54667	20.32 lbs.
	5 x36"	54669	25.30 lbs.
	6 x36"	54670	30.28 lbs.
	8 x36"	54672	40.32 lbs.
5/8"	⅝x36"	56508	3.98 lbs.
	¾x36"	56509	4.84 lbs.
	1 x36"	56510	6.56 lbs.
	1½x36"	56511	9.68 lbs.
	2 x36"	54675	12.80 lbs.
	2½x36"	54676	15.88 lbs.
	3 x36"	54677	18.96 lbs.
	3½x36"	54678	22.94 lbs.
	6 x36"	54681	37.92 lbs.
3/4"	¾x36"	54685	5.76 lbs.
	1 x36"	56512	7.68 lbs.
	1½x36"	56513	11.48 lbs.
	2 x36"	54686	15.36 lbs.
	3 x36"	54688	22.88 lbs.
	4 x36"	54690	30.72 lbs.
	6 x36"	54693	45.76 lbs.
7/8"	⅞x36"	54696	7.88 lbs.
	1 x36"	56514	8.96 lbs.
	1½x36"	56515	13.38 lbs.
	2 x36"	54697	17.92 lbs.
	3 x36"	54699	26.88 lbs.
	4 x36"	54700	35.84 lbs.
	6 x36"	54701	53.76 lbs.
1"	1 x36"	54702	10.18 lbs.
	1½x36"	56516	15.12 lbs.
	2 x36"	54703	20.36 lbs.
	2½x36"	56704	25.30 lbs.
	3 x36"	54705	30.24 lbs.
	4 x36"	54707	40.64 lbs.
	5 x36"	54709	50.60 lbs.
	6 x36"	54710	60.48 lbs.

Flat Ground Die Steel in 36" lengths is square on both edges only.
Ends furnished Saw cut in 18 1/16" and 36 1/16" lengths to allow for cutting.
NOTE: Prices on aplication for other lengths, widths, and thicknesses.

No. 498 Free Machining—Low Carbon Precision Ground Flat Stock



- ★ Free Machining—Longer Cutting Tool Life, Better Finish, Faster Production, Lower Machining Costs
- ★ 35% Better Machinability Than 1018 Low Carbon Steel
- ★ Thoroughly Stress Relieved
- ★ Low Carbon—Savings Up To 60% Over Tool Steel Flat Stock
- ★ Ideal For Parts Not Requiring Heat Treated Steels—Use Soft or Case Hardened
- ★ Full Length Identification—Cannot Be Confused With Other Steels
- ★ The Starrett Company Uses Its Own Ground Flat Stock and Die Stock for Many of Its Precision Tool Parts

Only Starrett No. 498 Low-Carbon Precision Ground Flat Stock gives you a true *free machining* steel with the *best* machinability of any ground flat stock. On a relative machinability rating of 100 for AISI 1018 steel, Starrett low carbon ground flat stock has a machinability rating of 137. Because of its *free machining* characteristics you get longer cutting tool life, better finish, faster production and lower machining costs.

The **low carbon** analysis of this steel also makes possible substantial cost reductions over tool steel ground stock with savings up to 60%, since you get one-third more steel at less cost. Costly finishing operations are also eliminated because this quality steel is precision ground to size and only requires laying out and cutting to the required shape.

Starrett No. 498 Free-Machining Low-Carbon Precision Ground Flat Stock is ideal for a wide variety of parts not needing more expensive heat treated steels—such as for stripper plates, jigs, fixtures, machine and component parts, templates or any part which can be used **soft** or be **case hardened.**

This free-machining, low-carbon, silicon-killed steel can be carburized or case hardened. Fine grain structure makes it ductile, tough and easily machined. When carburized or case hardened, its physical properties, especially tensile strength, yield point and Brinell hardness are substantially higher than other low carbon steels.

Precision ground to the same tolerances as Starrett No. 496 Oil Hardening tool steel ground flat stock. Fine finish insures accurate layout work. Stock sizes available from 1/16" to 2" thick, 3/8" to 12" wide, in 24" lengths. **To avoid confusion with other steels, each piece is identified on its full length, the only low carbon ground flat stock with this feature.** Each piece also is individually wrapped to prevent rusting and scratching, and clearly marked with carbon content and size.

Specifications

Furnished in 24 inch lengths ground straight and parallel. Standard thicknesses are within ±.001". For complete sizes, see next page.

Analysis

Starrett No. 498 Free-Machining Low-Carbon Precision Ground Flat Stock is a .12 carbon fine-grained, silicon-killed steel of forging quality which can be carburized or case hardened.

Heat Treatment

For many applications, can be used unhardened. However, if surface hardening is desired, it can be carburized or case hardened. If carburized, a case of 1/32" will be obtained if the steel is held in carburizing salt at 1700°F for three hours. If case hardened, a case of .008" will be obtained if the steel is immersed in a bath of sodium cyanide for 30 minutes at 1500°F.

FOR COMPLETE LISTING OF SIZES, SEE NEXT PAGE

Specifications—Precision Ground Flat Stock—24 Inch Lengths

No. 498 Free Machining—Low Carbon

Thickness	Width and Length	EDP No.	Weight Per Piece
1/16"	½x24"	54866	.21 lbs.
	¾x24"	54867	.32 lbs.
	1 x24"	54868	.42 lbs.
	1¼x24"	54869	.52 lbs.
	1½x24"	54870	.64 lbs.
	2 x24"	54871	.84 lbs.
	2½x24"	54872	1.06 lbs.
	3 x24"	54873	1.26 lbs.
	3½x24"	54874	1.48 lbs.
	4 x24"	54875	1.66 lbs.
	5 x24"	54876	2.12 lbs.
	6 x24"	54877	2.52 lbs
	8 x24"	54878	3.32 lbs.
3/32"	½x24"	54881	.32 lbs.
	¾x24"	54882	.46 lbs.
	1 x24"	54883	.64 lbs.
	1¼x24"	54884	.80 lbs.
	1½x24"	54885	.98 lbs.
	2 x24"	54886	1.30 lbs.
	2½x24"	54887	1.58 lbs.
	3 x24"	54888	1.92 lbs.
	4 x24"	54889	2.56 lbs.
	5 x24"	54890	3.16 lbs.
	6 x24"	54891	3.82 lbs.
	8 x24"	54892	5.12 lbs.
1/8"	½x24"	54893	.42 lbs.
	¾x24"	54894	.64 lbs.
	1 x24"	54895	.86 lbs.
	1¼x24"	54896	1.06 lbs.
	1½x24"	54897	1.26 lbs.
	2 x24"	54898	1.72 lbs.
	2½x24"	54899	2.12 lbs.
	3 x24"	54900	2.54 lbs.
	3½x24"	54901	2.96 lbs.
	4 x24"	54902	3.44 lbs.
	5 x24"	54903	4.26 lbs.
	6 x24"	54904	5.06 lbs.
	8 x24"	54905	6.88 lbs.
	10 x24"	54906	8.52 lbs.
	12 x24"	54907	10.12 lbs.
5/32"	½x24"	54908	.58 lbs.
	¾x24"	54909	.82 lbs.
	1 x24"	54910	1.06 lbs.
	1¼x24"	54911	1.32 lbs.
	1½x24"	54912	1.60 lbs.
	2 x24"	54913	2.14 lbs.
	2½x24"	54914	2.68 lbs.
	3 x24"	54915	3.18 lbs.
	4 x24"	54917	4.22 lbs.
	5 x24"	54918	5.36 lbs.
	6 x24"	54919	6.32 lbs.
3/16"	½x24"	54921	.64 lbs.
	¾x24"	54922	.96 lbs.
	1 x24"	54923	1.26 lbs.
	1¼x24"	54924	1.58 lbs.
	1½x24"	54925	1.92 lbs.
	2 x24"	54926	2.54 lbs.
	2½x24"	54927	3.20 lbs.
	3 x24"	54928	3.82 lbs.
	3½x24"	54929	4.46 lbs.
	4 x24"	54930	5.10 lbs.
	5 x24"	54931	6.42 lbs.
	6 x24"	54932	7.68 lbs.
	8 x24"	54933	10.24 lbs.
	10 x24"	54934	12.84 lbs.
1/4"	½x24"	54935	.85 lbs.
	¾x24"	54936	1.26 lbs.
	1 x24"	54937	1.70 lbs.
	1¼x24"	54938	2.14 lbs.
	1½x24"	54939	2.56 lbs.
	2 x24"	54940	3.40 lbs.
	2½x24"	54941	4.26 lbs.
	3 x24"	54942	5.10 lbs.
	3½x24"	54943	5.96 lbs.
	4 x24"	54944	6.54 lbs.
	5 x24"	54945	8.50 lbs.
	6 x24"	54946	9.94 lbs.
	8 x24"	54947	13.26 lbs.
	10 x24"	54948	17.00 lbs.
	12 x24"	54949	19.88 lbs.
5/16"	½x24"	54950	1.06 lbs.
	¾x24"	54951	1.62 lbs.
	1 x24"	54952	2.18 lbs.
	1¼x24"	54953	2.66 lbs.
	1½x24"	54954	3.16 lbs.
	2 x24"	54955	4.26 lbs.
	2½x24"	54956	7.32 lbs.
	3 x24"	54957	7.38 lbs.
	3½x24"	54958	7.44 lbs.
	4 x24"	54959	8.54 lbs.
	5 x24"	54960	10.58 lbs.
	6 x24"	54961	12.64 lbs.
	8 x24"	54962	16.86 lbs.
3/8"	1/8x24"	54964	.96 lbs.
	½x24"	54965	1.28 lbs.
	¾x24"	54966	1.92 lbs.
	1 x24"	54967	2.54 lbs.
	1¼x24"	54968	3.18 lbs.
	1½x24"	54969	3.82 lbs.
	2 x24"	54970	5.12 lbs.
	2½x24"	54971	6.34 lbs.
	3 x24"	54972	7.62 lbs.
	3½x24"	54973	8.94 lbs.
	4 x24"	54974	10.22 lbs.
	5 x24"	54975	12.70 lbs.
	6 x24"	54976	15.26 lbs.
	7 x24"	54977	17.78 lbs.
	8 x24"	54978	20.34 lbs.
	9 x24"	54979	22.92 lbs.
	10 x24"	54980	25.42 lbs.
	12 x24"	54981	30.52 lbs.
7/16"	7/16x24"	54982	1.31 lbs.
1/2"	½x24"	54983	1.72 lbs.
	¾x24"	54984	2.56 lbs.
	1 x24"	54985	3.38 lbs.
	1¼x24"	54986	4.26 lbs.
	1½x24"	54987	5.10 lbs.
	2 x24"	54988	6.78 lbs.
	2½x24"	54989	8.48 lbs.
	3 x24"	54990	10.08 lbs.
	3½x24"	54991	11.82 lbs.
	4 x24"	54992	13.54 lbs.
	5 x24"	54993	16.86 lbs.
	6 x24"	54994	20.18 lbs.
	7 x24"	54995	23.52 lbs.
	8 x24"	54996	26.88 lbs.
	9 x24"	54997	30.44 lbs.
	10 x24"	54998	33.60 lbs.
	12 x24"	54999	40.36 lbs.
9/16"	9/16x24"	55000	2.66 lbs.
5/8"	5/8x24"	55001	2.66 lbs.
	¾x24"	55002	3.23 lbs.
	1 x24"	55003	4.38 lbs.
	1¼x24"	55004	5.42 lbs.
	1½x24"	55005	6.46 lbs.
	2 x24"	55006	8.54 lbs.
	2½x24"	55007	10.58 lbs.
	3 x24"	55008	12.64 lbs.
	3½x24"	55009	14.86 lbs.
	4 x24"	55010	17.10 lbs.
	5 x24"	55011	21.18 lbs.
	6 x24"	55012	25.28 lbs.
	7 x24"	55013	29.50 lbs.
	8 x24"	55014	33.70 lbs.
	9 x24"	55015	38.40 lbs.
	10 x24"	55016	42.14 lbs.
3/4"	¾x24"	55017	3.84 lbs.
	1 x24"	55018	5.12 lbs.
	1¼x24"	55019	6.37 lbs.
	1½x24"	55020	7.66 lbs.
	2 x24"	55021	10.24 lbs.
	2½x24"	55022	12.74 lbs.
	3 x24"	55023	15.26 lbs.
	3½x24"	55024	17.86 lbs.
	4 x24"	55025	20.48 lbs.
	5 x24"	55026	25.50 lbs.
	6 x24"	55027	30.50 lbs.
	8 x24"	55028	40.66 lbs.
	9 x24"	55029	45.96 lbs.
	10 x24"	55030	50.84 lbs.
	12 x24"	55031	61.00 lbs.
7/8"	7/8x24"	55032	5.26 lbs.
	1 x24"	55033	5.97 lbs.
	1¼x24"	55034	7.43 lbs.
	1½x24"	55035	8.92 lbs.
	2 x24"	55036	11.94 lbs.
	2½x24"	55037	14.86 lbs.
	3 x24"	55038	17.80 lbs.
	4 x24"	55039	23.90 lbs.
	6 x24"	55040	25.60 lbs.
1"	1 x24"	55041	6.66 lbs.
	1¼x24"	55042	8.43 lbs.
	1½x24"	55043	10.08 lbs.
	2 x24"	55044	13.58 lbs.
	2½x24"	55045	16.86 lbs.
	3 x24"	55046	20.16 lbs.
	3½x24"	55047	23.62 lbs.
	4 x24"	55048	27.10 lbs.
	5 x24"	55049	33.70 lbs.
	6 x24"	55050	40.32 lbs.
	8 x24"	55051	54.18 lbs.
	9 x24"	55052	60.80 lbs.
	10 x24"	55053	67.42 lbs.
	12 x24"	55054	80.64 lbs.
1 1/4"	1¼x24"	55055	10.60 lbs.
	1½x24"	55056	12.71 lbs.
	2 x24"	55057	16 98 lbs.
	2½x24"	55058	21.18 lbs.
	3 x24"	55059	25.42 lbs.
	4 x24"	55060	33.86 lbs.
	5 x24"	55061	41.42 lbs.
	6 x24"	55062	50.38 lbs.
1 1/2"	1½x24"	55066	15.34 lbs.
	2 x24"	55067	20.40 lbs.
	2½x24"	55068	25.46 lbs.
	3 x24"	55069	30.66 lbs.
	3½x24"	55070	35.74 lbs.
	4 x24"	55071	40.80 lbs.
	5 x24"	55072	51.06 lbs.
	6 x24"	55073	61.20 lbs.
2"	2 x24"	55076	27.20 lbs.

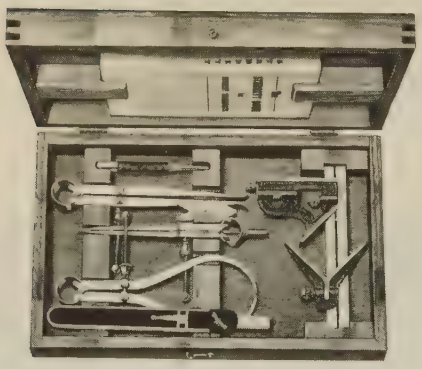
Prices on application for other lengths, widths, and thicknesses.

Starrett®

Vocational and Educational Material

Set of Tools No. S901Z

EDP No. 53090



No. S901 Set of Tools provides basic shop tools in a strong, attractive, protective case. Tools are held in slotted wood dividers. The Starrett Book for Student Machinists, held in top of case, gives the learner an opportunity to combine study with practical shop work.

Cat. No.	Description
11HC-6-4R	6″ Combination Square with Center Head
C309R-6	6″ Flexible Steel Rule in Pocket Case with Clip
117B	Center Punch
C391	Center Gage
83A-6	6″ Divider with Solid Nut
79A-6	6″ Outside Caliper with Solid Nut
73A-6	6″ Inside Caliper with Solid Nut
1700	The Starrett Book for Student Machinists

Packed One Set in a Box

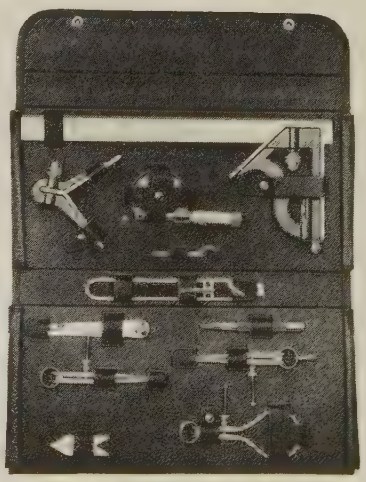
Set of Tools No. S902BZ

EDP No. 53091

This set of tools will appeal to all students and apprentices who desire a more complete set of basic tools for shop work. Tools are furnished in an attractive, protective case. Folding to a compact size, No. S902 Set is convenient to carry, handy to use in school, home and shop.

Cat. No.	Description
436P-1	1″ Micrometer without Ratchet Stop, without Lock Nut
11HC-12-4R	12″ Combination Square with Center Head
C391	Center Gage
117D	Center Punch
C309R-6	6″ Flexible Steel Rule in Pocket Case with Clip
277-4	4″ Divider
275-4	4″ Outside Caliper
274-4	4″ Inside Caliper
563-4	4″ Hermaphrodite Caliper

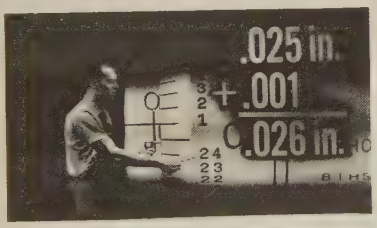
Packed One Set in a Box



Educational Films

- **12½ Minute Instructional Films—16 mm Sound-Color or Videocassette—Each Devoted to a Single Tool.**
- **Film Qualifies Under the Elementary and Secondary Educational Act Title II and N.D.E.A. Title III.**

Starrett teaching units—films that take students step-by-step through the reading, use and care of precision measuring tools. Instruction is by voice, hands-on demonstration and **Projected Presentations®**, a technique by which screen-filling close-ups are shown simultaneously with demonstrations.



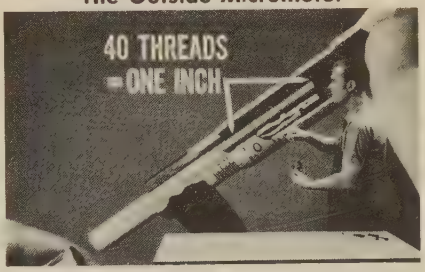
The films provide a sound-color overview of the subject, running time approximately 12½ minutes. The films cover the subject area in great detail. They are recommended for showing to the entire class.

Film Formats. 16 mm sound-color to fit any standard 16 mm sound projector. Also available in videocassette format, Sony ¾" U-Matic and ½" VHS or Beta II, at same price as film format.

16 mm sound-color film.

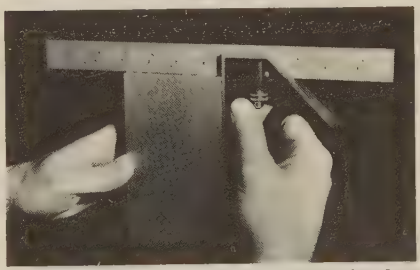
Ordering Suggestions. Starrett films are priced and should be obtained by school or company purchase order. Projectors may be obtained from your photographic or audio-visual dealer. They are not sold by the L. S. Starrett Company.

The Outside Micrometer



Principal parts, zero setting and tensioning, holding, cleaning measuring faces, opening rapidly, developing "feel", using screw thread to obtain linear measurements, decimal equivalents, reading to .001" and .0001", correct handling and storage.

The Combination Set



Principal parts, assembling square head to blade, reversibility of square head on blade, 90° and 45° angles, spirit level, built-in scriber, blade graduations, reversible lock bolt, assembling center head to blade, finding center of round stock, assembling protractor head to blade, reading angles, locking turret.

NOTE: Starrett Combination Sets are available in 12", 18" and 24" sizes (English); 300 mm and 600 mm sizes (metric); 300 mm and 11¼", 600 mm and 23½" (combination metric and English). See pages 151, 156-159.

Instructional Films
Sound-Color—12½ Minutes

Cat. No.	EDP No.	Description or Title
1716	55897	The Outside Micrometer 16 mm Reel in Metal Can
1719	56093	The Combination Set 16 mm Reel in Metal Can

Films and video cassettes individually packaged and labeled.

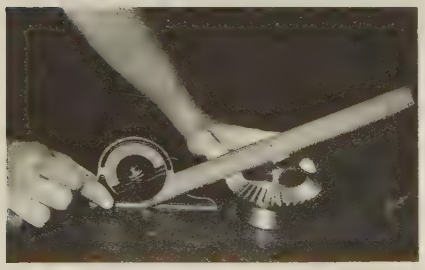
Educational Films—Cont.

The Combination Square

Setting readings on blade, scribing lines, cross lines, 45° angles on work, transferring measurements, locating hole centers, using as height gage, setting up work on angle iron, checking alignment of assembled part, locating work in drill press vise, lining up milling machine vise, inspecting machined part to shop drawing.

NOTE: Starrett Combination Squares are available 4", 6", 12", 18" and 24" sizes (English); 150 mm, 300 mm, 600 mm sizes (metric); 300 mm and 11¾", 600 mm and 23½" (combination metric and English). See pages 151, 152-155.

The Bevel Protractor



Scale of degrees, setting acute and obtuse angles, measuring an unknown angle, laying out angles, transferring angles from drawing to work, setting work at vertical angle, using spirit level, setting work on fixture, vise on milling machine and shaft in dividing head, checking work dimensions after machining.

NOTE: Starrett Bevel Protractors are available in 12", 18" and 24" sizes (English); 300 mm and 11¾" (combination metric and English). See pages 151, 161.

The Vernier Caliper

Outside Measurement

Inside Measurement

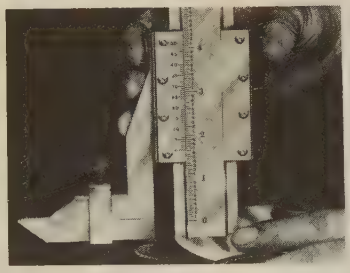
How to hold and use a caliper with 50-division vernier plate, how to adjust slide, make fine adjustments and lock slide in final position, setting the caliper to various readings, measuring actual workpiece inside and outside diameters, slot widths, overall dimensions.

Instructional Films
Sound-Color—12½ Minutes

Cat. No.	EDP No.	Description or Title
1722	56095	The Combination Square 16 mm Reel in Metal Can
1725	56097	The Bevel Protractor 16 mm Reel in Metal Can
1728	56340	The Vernier Caliper 16 mm Reel in Metal Can

Films and video cassettes individually packaged and labeled.

Educational Films—Cont.



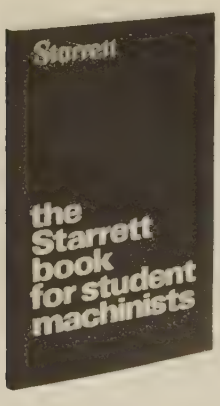
The Vernier Height Gage

Defines vernier height gage main parts and vernier principle, how to read in the English and metric systems, layout and inspection procedures, tests on readings in inches and millimeters.

Instructional Films
Sound-Color—12½ Minutes

Cat. No.	EDP No.	Description or Title
1731	56438	The Vernier Height Gage 16 mm Reel in Metal Can

Films and video cassettes individually packaged and labeled.



The Starrett Book for Student Machinists—Cat. No. 1700

EDP No. 53218

This familiar handbook for machine shop beginners has been revised by a leading educator. It is written in clear, simple language, contains 160 pages including 200 diagrams, illustrations, reference tables, and is fully indexed. Printed on coated paper with soil-resistant binding. **Chapter headings:** Mechanical Drawing: Fits and Terminology; Bench Work; How to Make Measurements; Cutting Speed and Cutting Fluids; Drilling and Related Operations; Lathe Operations; Grinding; Metal Sawing; Toolmaking; Geometry; Mechanics.

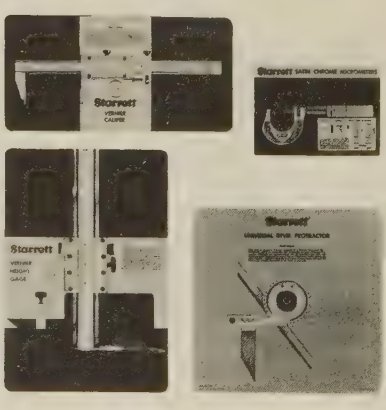
Priced Item—See Separate Price List

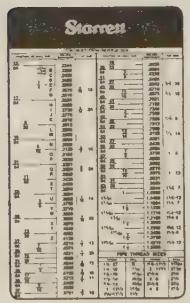
Training Aid Kit Cat. No. 1701

EDP No. 53219

Four slide charts showing how to read the outside micrometer; vernier caliper and vernier height gage (with 50-division vernier plates); and the vernier protractor. Each tool printed full size on rugged card stock. The student adjusts each chart by moving a die cut slide or disc to any desired setting and obtains readings as though he were using the actual tool. "How to read" instructions printed on the back of each chart. Packed one set of four in an envelope.

Priced Item—See Separate Price List





Decimal Equivalent Card

Decimal Equivalent Card—English. Identical to wall size chart. Printed in two colors with figures on both sides. Pocket size—3" x 5". Rounded corners.

Single copy mailed to individual craftsmen. Sent in reasonable quantity—on letterhead request—to school shop instructors and training specialists in industry.

The Starrett Story

A brief history of the company founded over 100 years ago by an early mechanical genius, Laroy S. Starrett. It reviews the founder's boyhood years, business problems and successes, tools introduced, personal philosophy and community service. A fascinating story of ambition, perseverance, accomplishment and contribution to industry and fellow man. 6-7/8" x 4-5/8". 36 pages. Over 50 illustrations including the Starrett plant, tools and people.

Single copy mailed to individual craftsmen. Sent in reasonable quantity—on letterhead request—to school shop instructors and training specialists in industry.

The Tools and Rules for Precision Measuring

This comprehensive, illustrated booklet tells the story of precision measurement in a simple down-to-earth way that appeals to students. Subject matter includes:

- Linear measuring standards
- Measuring and transferring measurements
- Steel rules
- Calipers and dividers
- How to read vernier tools
- How to read the micrometer
- Types of micrometers
- Dial indicators
- Gage blocks and digital measuring tools
- Laying out with accuracy
- Measuring lathe work
- Measuring screw threads
- Facts about fits
- Limits of tolerance

In addition, the booklet contains six pages of helpful reference data—decimal equivalents, squares, cubes, square and cube roots, tap, drill and screw thread information. A valuable aid for every training program. 5-1/4" x 7-5/8". 73 pages. Nearly 100 illustrations.

Single copy mailed to individual craftsmen. Sent in reasonable quantity—on letterhead request—to school shop instructors and training specialists in industry.

Helpful Information for Student Machinists Bulletin No. 1201

Lists and describes Starrett publications and reference cards available to the learner. Illustrates Starrett steel rule, combination square, center punch, calipers, divider and sets of tools. Includes instructions on how to read the micrometer plus a handy table of shop fractions to decimal and metric equivalents. 6-3/8" x 3-1/4" folding out to 12-3/4" x 9-3/4".

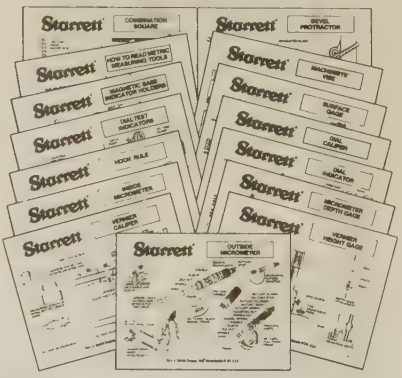
Single copy mailed to individual craftsmen. Sent in reasonable quantity—on letterhead request—to school shop instructors and training specialists in industry.

Educational Charts Cat. No. 1702

EDP No. 56172

Fifteen wall size whiteprint charts (14-5/8" x 18-5/8") help learners recognize basic tools, their principal parts and uses. Tools displayed: outside and inside micrometers; micrometer depth gage; vernier caliper and height gage; hook rule; combination square and bevel protractor; dial indicator and dial test indicators; dial caliper; magnetic base indicator holders; surface gage; machinists' vise. The last chart in the set shows how to read metric measuring tools.

Priced Item—See Separate Price List



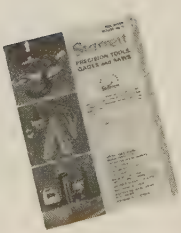
Student Notebook Pages—Cat. No. 1715

EDP No. 53220

Identical to Cat. No. 1702 Educational Charts except 11" x 8½" in size and punched to fit the standard three ring binder used by students.

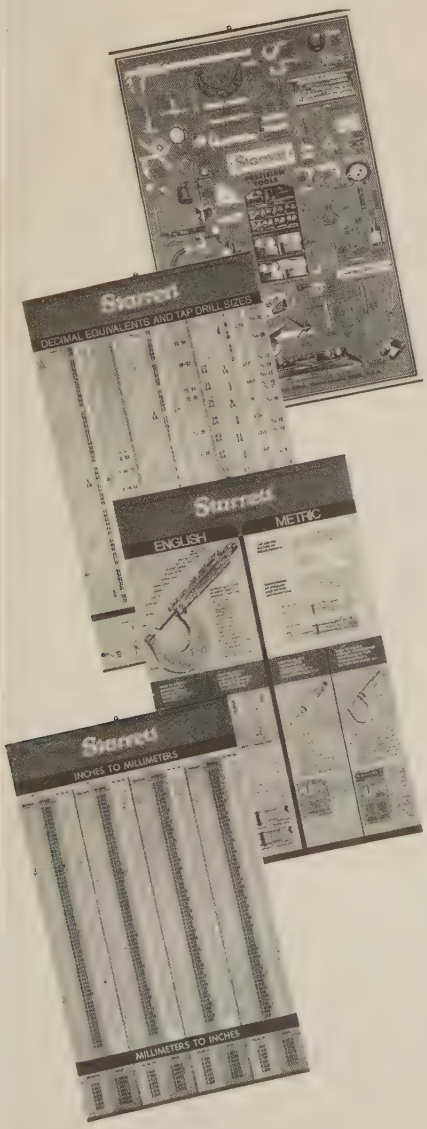
Priced Item—See Separate Price List

General Catalog No. 28



Reference book and buying guide of machinists, toolmakers, inspectors and technical specialists in industry. Covers precision measuring tools; steel tapes; dial indicators and dial gages; gage blocks and digital measuring tools; granite surface plates; machinists' vises; hacksaws, band saws, hole saws; and precision ground flat stock. 7-5/8" x 5-1/4". 544 pages. *Mailed on request to individual craftsmen, school shop instructors and training specialists in industry.*

Wall Size Charts



Sample copies of the four charts below sent—on letterhead request—to school shop instructors and training specialists in industry.

Tool Chart. Displays over fifty hand tools: vernier gages, micrometers, steel rules, hole gages, protractors, V-blocks, test indicators, squares, level, punches, center and edge finders, scribers, pin vises, tap wrench, and radius, feeler and screw pitch gages. 26" x 41-1/4". Printed in two colors. Tinned top and bottom. Eyelet for hanging. Packed one in a mailing tube.

Decimal Equivalent and Tap Drill Chart. Decimal equivalents of 8ths, 16ths, 32nds and 64ths of an inch; decimal equivalents of letter size drills (A-Z) and number size drills (1-80); and drill sizes for standard taps from #0-80 to 1-1/2-12 (approx. 65% thread) and pipe taps from 1/8-27 to 4-8. 25" x 41-1/2". Printed in two colors. Tinned top and bottom. Eyelet for hanging. Packed one in a mailing tube.

Micrometer Chart. Features cut-away view of micrometer, showing principal parts and their relationship in assembly. Simplified text tells how to read in both English (.001" and .0001") and metric (0.01 mm and 0.002 mm). Includes pictorial test readings. 25" x 41-1/2". Printed in two colors. Tinned top and bottom. Eyelet for hanging. Packed one in a mailing tube.

Metric Conversion Chart. Converts shop fractions to decimal and metric equivalents; decimals to millimeters from .001" to .100" in steps of .001", and from .100" to 1.000" in steps of .010"; and millimeters to decimals from 0.001 mm to 0.010 mm in steps of 0.001 mm, from 0.010 mm to 0.100 mm in steps of 0.010 mm, and from 0.100 mm to 1 mm in steps of 0.100 mm. 25" x 42-7/8". Printed in two colors. Tinned top and bottom. Eyelet for hanging. Packed one in a mailing tube.

Starrett®

Reference Tables

Metric and English Conversion

Measures of Length

1 millimeter (mm) = 0.03937 inch
1 centimeter (cm) = 0.39370 inch
1 meter (m) = 39.37008 inches
= 3.2808 feet
= 1.0936 yards
1 kilometer (km) = 0.6214 mile
1 inch = 25.4 millimeters (mm)
= 2.54 centimeters (cm)
1 foot = 304.8 millimeters (mm)
= 0.3048 meter (m)
1 yard = 0.9144 meter (m)
1 mile = 1.609 kilometers (km)

Measures of Area

1 square millimeter = 0.00155 square inch
1 square centimeter = 0.155 square inch
1 square meter = 10.764 square feet
= 1.196 square yards
1 square kilometer = 0.3861 square mile
1 square inch = 645.2 square millimeters
= 6.452 square centimeters
1 square foot = 929 square centimeters
= 0.0929 square meter
1 square yard = 0.836 square meter
1 square mile = 2.5899 square kilometers

Measures of Capacity (Dry)

1 cubic centimeter (cm^3) = 0.061 cubic inch
1 liter = 0.0353 cubic foot
= 61.023 cubic inches
1 cubic meter (m^3) = 35.315 cubic feet
= 1.308 cubic yards
1 cubic inch = 16.38706 cubic centimeters (cm^3)
1 cubic foot = 0.02832 cubic meter (m^3)
= 28.317 liters
1 cubic yard = 0.7646 cubic meter (m^3)

Measures of Capacity (Liquid)

1 liter = 1.0567 U.S. quarts
= 0.2642 U.S. gallon
= 0.2200 Imperial gallon
1 cubic meter (m^3) = 264.2 U.S. gallons
= 219.969 Imperial gallons
1 U.S. quart = 0.946 liter
1 Imperial quart = 1.136 liters
1 U.S. gallon = 3.785 liters
1 Imperial gallon = 4.546 liters

Measures of Weight

1 gram (g) = 15.432 grains
= 0.03215 ounce troy
= 0.03527 ounce avoirdupois
1 kilogram (kg) = 35.274 ounces avoirdupois
= 2.2046 pounds
1000 kilograms (kg) = 1 metric ton (t)
= 1.1023 tons of 2000 pounds
= 0.9842 ton of 2240 pounds
1 ounce avoirdupois = 28.35 grams (g)
1 ounce troy = 31.103 grams (g)
1 pound = 453.6 grams
= 0.4536 kilogram (kg)
1 ton of 2240 pounds = 1016 kilograms (kg)
= 1.016 metric tons
1 grain = 0.0648 gram (g)
1 metric ton = 0.9842 ton of 2240 pounds
= 2204.6 pounds

English to Metric Conversion Table

Decimals to Millimeters

Decimal	mm	Decimal	mm
0.001	0.0254	0.500	12.7000
0.002	0.0508	0.510	12.9540
0.003	0.0762	0.520	13.2080
0.004	0.1016	0.530	13.4620
0.005	0.1270	0.540	13.7160
0.006	0.1524	0.550	13.9700
0.007	0.1778	0.560	14.2240
0.008	0.2032	0.570	14.4780
0.009	0.2286	0.580	14.7320
0.010	0.2540	0.590	14.9860
0.020	0.5080		
0.030	0.7620		
0.040	1.0160	0.600	15.2400
0.050	1.2700	0.610	15.4940
0.060	1.5240	0.620	15.7480
0.070	1.7780	0.630	16.0020
0.080	2.0320	0.640	16.2560
0.090	2.2860	0.650	16.5100
0.100	2.5400	0.660	16.7640
0.110	2.7940	0.670	17.0180
0.120	3.0480	0.680	17.2720
0.130	3.3020	0.690	17.5260
0.140	3.5560		
0.150	3.8100		
0.160	4.0640	0.700	17.7800
0.170	4.3180	0.710	18.0340
0.180	4.5720	0.720	18.2880
0.190	4.8260	0.730	18.5420
0.200	5.0800	0.740	18.7960
0.210	5.3340	0.750	19.0500
0.220	5.5880	0.760	19.3040
0.230	5.8420	0.770	19 5580
0.240	6.0960	0.780	19.8120
0.250	6.3500	0.790	20.0660
0.260	6.6040		
0.270	6.8580		
0.280	7.1120	0.800	20.3200
0.290	7.3660	0.810	20.5740
0.300	7.6200	0.820	20.8280
0.310	7.8740	0.830	21.0820
0.320	8.1280	0.840	21.3360
0.330	8.3820	0.850	21.5900
0.340	8.6360	0.860	21.8440
0.350	8.8900	0.870	22.0980
0.360	9.1440	0.880	22.3520
0.370	9.3980	0.890	22.6060
0.380	9.6520		
0.390	9.9060		
		0.900	22.8600
0.400	10.1600	0.910	23.1140
0.410	10.4140	0.920	23.3680
0.420	10.6680	0.930	23.6220
0.430	10.9220	0.940	23.8760
0.440	11.1760	0.950	24.1300
0.450	11.4300	0.960	24.3840
0.460	11.6840	0.970	24.6380
0.470	11.9380	0.980	24.8920
0.480	12.1920	0.990	25.1460
0.490	12.4460	1.000	25.4000

Fractions to Decimals to Millimeters

Fraction	Decimal	mm	Fraction	Decimal	mm
1/64	0.0156	0.3969	33/64	0.5156	13.0969
1/32	0.0312	0.7938	17/32	0.5312	13.4938
3/64	0.0469	1.1906	35/64	0.5469	13.8906
1/16	0.0625	1.5875	9/16	0.5625	14.2875
5/64	0.0781	1.9844	37/64	0.5781	14.6844
3/32	0.0938	2.3812	19/32	0.5938	15.0812
7/64	0.1094	2.7781	39/64	0.6094	15.4781
1/8	0.1250	3.1750	5/8	0.6250	15.8750
9/64	0.1406	3.5719	41/64	0.6406	16.2719
5/32	0.1562	3.9688	21/32	0.6562	16.6688
11/64	0.1719	4.3656	43/64	0.6719	17.0656
3/16	0.1875	4.7625	11/16	0.6875	17.4625
13/64	0.2031	5.1594	45/64	0.7031	17.8594
7/32	0.2188	5.5562	23/32	0.7188	18.2562
15/64	0.2344	5.9531	47/64	0.7344	18.6531
1/4	0.2500	6.3500	3/4	0.7500	19.0500
17/64	0.2656	6.7469	49/64	0.7656	19.4469
9/32	0.2812	7.1438	25/32	0.7812	19.8438
19/64	0.2969	7.5406	51/64	0.7969	20.2406
5/16	0.3125	7.9375	13/16	0.8125	20.6375
21/64	0.3281	8.3344	53/64	0.8281	21.0344
11/32	0.3438	8.7312	27/32	0.8438	21.4312
23/64	0.3594	9.1281	55/64	0.8594	21.8281
3/8	0.3750	9.5250	7/8	0.8750	22.2250
25/64	0.3906	9.9219	57/64	0.8906	22.6219
13/32	0.4062	10.3188	29/32	0.9062	23.0188
27/64	0.4219	10.7156	59/64	0.9219	23.4156
7/16	0.4375	11.1125	15/16	0.9375	23.8125
29/64	0.4531	11.5094	61/64	0.9531	24.2094
15/32	0.4688	11.9062	31/32	0.9688	24.6062
31/64	0.4844	12.3031	63/64	0.9844	25.0031
1/2	0 5000	12.7000	1	1.0000	25.4000

Metric to English Conversion Table

mm	Decimal	mm	Decimal	mm	Decimal	mm	Decimal	mm	Decimal
0.01	.00039	0.41	.01614	0.81	.03189	21	.82677	61	2.40157
0.02	.00079	0.42	.01654	0.82	.03228	22	.86614	62	2.44094
0.03	.00118	0.43	.01693	0.83	.03268	23	.90551	63	2.48031
0.04	.00157	0.44	.01732	0.84	.03307	24	.94488	64	2.51969
0.05	.00197	0.45	.01772	0.85	.03346	25	.98425	65	2.55906
0.06	.00236	0.46	.01811	0.86	.03386	26	1.02362	66	2.59843
0.07	.00276	0.47	.01850	0.87	.03425	27	1.06299	67	2.63780
0.08	.00315	0.48	.01890	0.88	.03465	28	1.10236	68	2.67717
0.09	.00354	0.49	.01929	0.89	.03504	29	1.14173	69	2.71654
0.10	.00394	0.50	.01969	0.90	.03543	30	1.18110	70	2.75591
0.11	.00433	0.51	.02008	0.91	.03583	31	1.22047	71	2.79528
0.12	.00472	0.52	.02047	0.92	.03622	32	1.25984	72	2.83465
0.13	.00512	0.53	.02087	0.93	.03661	33	1.29921	73	2.87402
0.14	.00551	0.54	.02126	0.94	.03701	34	1.33858	74	2.91339
0.15	.00591	0.55	.02165	0.95	.03740	35	1.37795	75	2.95276
0.16	.00630	0.56	.02205	0.96	.03780	36	1.41732	76	2.99213
0.17	.00669	0.57	.02244	0.97	.03819	37	1.45669	77	3.03150
0.18	.00709	0.58	.02283	0.98	.03858	38	1.49606	78	3.07087
0.19	.00748	0.59	.02323	0.99	.03898	39	1.53543	79	3.11024
0.20	.00787	0.60	.02362	1.00	.03937	40	1.57480	80	3.14961
0.21	.00827	0.61	.02402	1	.03937	41	1.61417	81	3.18898
0.22	.00866	0.62	.02441	2	.07874	42	1.65354	82	3.22835
0.23	.00906	0.63	.02480	3	.11811	43	1.69291	83	3.26772
0.24	.00945	0.64	.02520	4	.15748	44	1.73228	84	3.30709
0.25	.00984	0.65	.02559	5	.19685	45	1.77165	85	3.34646
0.26	.01024	0.66	.02598	6	.23622	46	1.81102	86	3.38583
0.27	.01063	0.67	.02638	7	.27559	47	1.85039	87	3.42520
0.28	.01102	0.68	.02677	8	.31496	48	1.88976	88	3.46457
0.29	.01142	0.69	.02717	9	.35433	49	1.92913	89	3.50394
0.30	.01181	0.70	.02756	10	.39370	50	1.96850	90	3.54331
0.31	.01220	0.71	.02795	11	.43307	51	2.00787	91	3.58268
0.32	.01260	0.72	.02835	12	.47244	52	2.04724	92	3.62205
0.33	.01299	0.73	.02874	13	.51181	53	2.08661	93	3.66142
0.34	.01339	0.74	.02913	14	.55118	54	2.12598	94	3.70079
0.35	.01378	0.75	.02953	15	.59055	55	2.16535	95	3.74016
0.36	.01417	0.76	.02992	16	.62992	56	2.20472	96	3.77953
0.37	.01457	0.77	.03032	17	.66929	57	2.24409	97	3.81890
0.38	.01496	0.78	.03071	18	.70866	58	2.28346	98	3.85827
0.39	.01535	0.79	.03110	19	.74803	59	2.32283	99	3.89764
0.40	.01575	0.80	.03150	20	.78740	60	2.36220	100	3.93701

Decimal Equivalents of 8ths, 16ths, 32nds, 64ths

8ths	32nds	64ths	64ths
1/8 = .125	1/32 = .03125	1/64 = .015625	33/64 = .515625
1/4 = .250	3/32 = .09375	3/64 = .046875	35/64 = .546875
3/8 = .375	5/32 = .15625	5/64 = .078125	37/64 = .578125
1/2 = .500	7/32 = .21875	7/64 = .109375	39/64 = .609375
5/8 = .625	9/32 = .28125	9/64 = .140625	41/64 = .640625
3/4 = .750	11/32 = .34375	11/64 = .171875	43/64 = .671875
7/8 = .875	13/32 = .40625	13/64 = .203125	45/64 = .703125
16ths	15/32 = .46875	15/64 = .234375	47/64 = .734375
1/16 = .0625	17/32 = .53125	17/64 = .265625	49/64 = .765625
3/16 = .1875	19/32 = .59375	19/64 = .296875	51/64 = .796875
5/16 = .3125	21/32 = .65625	21/64 = .328125	53/64 = .828125
7/16 = .4375	23/32 = .71875	23/64 = .359375	55/64 = .859375
9/16 = .5625	25/32 = .78125	25/64 = .390625	57/64 = .890625
11/16 = .6875	27/32 = .84375	27/64 = .421875	59/64 = .921875
13/16 = .8125	29/32 = .90625	29/64 = .453125	61/64 = .953125
15/16 = .9375	31/32 = .96875	31/64 = .484375	63/64 = .984375

Decimal Equivalents of Letter Size Drills

Letter	Size of Drill in Inches	Letter	Size of Drill in Inches
A	.234	N	.302
B	.238	O	.316
C	.242	P	.323
D	.246	Q	.332
E	.250	R	.339
F	.257	S	.348
G	.261	T	.358
H	.266	U	.368
I	.272	V	.377
J	.277	W	.386
K	.281	X	.397
L	.290	Y	.404
M	.295	Z	.413

Decimal Equivalents of Number Size Drills

No.	Size of Drill in Inches	No.	Size of Drill in Inches	No.	Size of Drill in Inches	No.	Size of Drill in Inches
1	.2280	21	.1590	41	.0960	61	.0390
2	.2210	22	.1570	42	.0935	62	.0380
3	.2130	23	.1540	43	.0890	63	.0370
4	.2090	24	.1520	44	.0860	64	.0360
5	.2055	25	.1495	45	.0820	65	.0350
6	.2040	26	.1470	46	.0810	66	.0330
7	.2010	27	.1440	47	.0785	67	.0320
8	.1990	28	.1405	48	.0760	68	.0310
9	.1960	29	.1360	49	.0730	69	.0292
10	.1935	30	.1285	50	.0700	70	.0280
11	.1910	31	.1200	51	.0670	71	.0260
12	.1890	32	.1160	52	.0635	72	.0250
13	.1850	33	.1130	53	.0595	73	.0240
14	.1820	34	.1110	54	.0550	74	.0225
15	.1800	35	.1100	55	.0520	75	.0210
16	.1770	36	.1065	56	.0465	76	.0200
17	.1730	37	.1040	57	.0430	77	.0180
18	.1695	38	.1015	58	.0420	78	.0160
19	.1660	39	.0995	59	.0410	79	.0145
20	.1610	40	.0980	60	.0400	80	.0135

American Standard Pipe Thread and Tap Drill Sizes

Pipe Size Inches	Threads Per Inch	Root Diameter Small End of Pipe and Gage	Tap Drill	
			Taper NPT	Straight NPS
1/8	27	.3339"	Q	11/32"
1/4	18	.4329"	7/16"	7/16"
3/8	18	.5676"	9/16"	37/64"
1/2	14	.7013"	45/64"	23/32"
3/4	14	.9105"	29/32"	59/64"
1	11-1/2	1.1441"	1-9/64"	1-5/32"
1-1/4	11-1/2	1.4876"	1-31/64"	1-1/2"
1-1/2	11-1/2	1.7265"	1-47/64"	1-3/4"
2	11-1/2	2.1995"	2-13/64"	2-7/32"

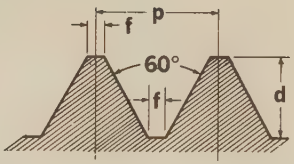
American National and Unified Coarse and Fine Thread Dimensions and Tap Drill Sizes

p = pitch $= \frac{1}{\text{No. thrd. per in.}}$

d = depth $= p \times .649519$

f = flat $= \frac{p}{8}$

pitch diameter $= D - \frac{.6495}{N}$



For Nos. 575 and 585 Screw Thread Micrometers

Size	Threads per inch NC UNC	Threads per inch NF UNF	Outside Diameter Inches	Pitch Diameter Inches	Root Diameter Inches	Tap Drill Approx. 75% Full Thread	Decimal Equiv. of Tap Drill
0	..	80	.0600	.0519	.0438	3/64	.0469
1	64	..	.0730	.0629	.0527	53	.0595
1	..	72	.0730	.0640	.0550	53	.0595
2	56	..	.0860	.0744	.0628	50	.0700
2	..	64	.0860	.0759	.0657	50	.0700
3	48	..	.0990	.0855	.0719	47	.0785
3	..	56	.0990	.0874	.0758	46	.0810
4	40	..	.1120	.0958	.0795	43	.0890
4	..	48	.1120	.0985	.0849	42	.0935
5	40	..	.1250	.1088	.0925	38	.1015
5	..	44	.1250	.1102	.0955	37	.1040
6	32	..	.1380	.1177	.0974	36	.1065
6	..	40	.1380	.1218	.1055	33	.1130
8	32	..	.1640	.1437	.1234	29	.1360
8	..	36	.1640	.1460	.1279	29	.1360
10	24	..	.1900	.1629	.1359	26	.1470
10	..	32	.1900	.1697	.1494	21	.1590
12	24	..	.2160	.1889	.1619	16	.1770
12	..	28	.2160	.1928	.1696	15	.1800
1/4	20	..	.2500	.2175	.1850	7	.2010
1/4	..	28	.2500	.2268	.2036	3	.2130
5/16	18	..	.3125	.2764	.2403	F	.2570
5/16	..	24	.3125	.2854	.2584	I	.2720
3/8	16	..	.3750	.3344	.2938	5/16	.3125
3/8	..	24	.3750	.3479	.3209	Q	.3320
7/16	14	..	.4375	.3911	.3447	U	.3680
7/16	..	20	.4375	.4050	.3726	25/64	.3906
1/2	13	..	.5000	.4500	.4001	27/64	.4219
1/2	..	20	.5000	.4675	.4351	29/64	.4531
9/16	12	..	.5625	.5084	.4542	31/64	.4844
9/16	..	18	.5625	.5264	.4903	33/64	.5156
5/8	11	..	.6250	.5660	.5069	17/32	.5312
5/8	..	18	.6250	.5889	.5528	37/64	.5781
3/4	10	..	.7500	.6850	.6201	21/32	.6562
3/4	..	16	.7500	.7094	.6688	11/16	.6875
7/8	9	..	.8750	.8028	.7307	49/64	.7656
7/8	..	14	.8750	.8286	.7822	13/16	.8125

American National and Unified Coarse and Fine Thread Dimensions and Tap Drill Sizes—Continued

Size	Threads per inch NC UNC	Threads per inch NF UNF	Outside Diameter Inches	Pitch Diameter Inches	Root Diameter Inches	Tap Drill Approx. 75% Full Thread	Decimal Equiv. of Tap Drill
1	8	..	1.0000	.9188	.8376	7/8	.8750
1	..	12	1.0000	.9459	.8917	59/64	.9219
1 1/8	7	..	1.1250	1.0322	.9394	63/64	.9844
1 1/8	..	12	1.1250	1.0709	1.0168	1 3/64	1.0469
1 1/4	7	..	1.2500	1.1572	1.0644	1 7/64	1.1094
1 1/4	..	12	1.2500	1.1959	1.1418	1 11/64	1.1719
1 3/8	6	..	1.3750	1.2667	1.1585	1 7/32	1.2187
1 3/8	..	12	1.3750	1.3209	1.2668	1 19/64	1.2969
1 1/2	6	..	1.5000	1.3917	1.2835	1 11/32	1.3437
1 1/2	..	12	1.5000	1.4459	1.3918	1 27/64	1.4219
1 3/4	5	..	1.7500	1.6201	1.4902	1 9/16	1.5625
2	4 1/2	..	2.0000	1.8557	1.7113	1 25/32	1.7812
2 1/4	4 1/2	..	2.2500	2.1057	1.9613	2 1/32	2.0313
2 1/2	4	..	2.5000	2.3376	2.1752	2 1/4	2.2500
2 3/4	4	..	2.7500	2.5876	2.4252	2 1/2	2.5000
3	4	..	3.0000	3.8376	2.6752	2 3/4	2.7500
3 1/4	4	..	3.2500	3.0876	2.9252	3	3.0000
3 1/2	4	..	3.5000	3.3376	3.1752	3 1/4	3.2500
3 3/4	4	..	3.7500	3.5876	3.4252	3 1/2	3.5000
4	4	..	4.0000	3.3786	3.6752	3 3/4	3.7500

Tap Drill Sizes *For Fractional Size Threads*

Approximately 65% Depth Thread

AMERICAN NATIONAL THREAD FORM

Tap Size	Threads per Inch	Diam. Hole	Drill	Tap Size	Threads per Inch	Diam. Hole	Drill
1/16	72	.049	3/64	1/2	20	.451	29/64
1/16	64	.047	3/64	1/2	13	.425	27/64
1/16	60	.046	56	1/2	12	.419	27/64
5/64	72	.065	52	9/16	27	.526	17/32
5/64	64	.063	1/16	9/16	18	.508	33/64
5/64	60	.062	1/16	9/16	12	.481	31/64
5/64	56	.061	53	5/8	27	.589	19/32
3/32	60	.077	5/64	5/8	18	.571	37/64
3/32	56	.076	48	5/8	12	.544	35/64
3/32	50	.074	49	5/8	11	.536	17/32
3/32	48	.073	49	11/16	16	.627	5/8
7/64	56	.092	42	11/16	11	.599	19/32
7/64	50	.090	43	3/4	27	.714	23/32
7/64	48	.089	43	3/4	16	.689	11/16
1/8	48	.105	36	3/4	12	.669	43/64
1/8	40	.101	38	3/4	10	.653	21/32
1/8	36	.098	40	13/16	12	.731	47/64
1/8	32	.095	3/32	13/16	10	.715	23/32
9/64	40	.116	32	7/8	27	.839	27/32
9/64	36	.114	33	7/8	18	.821	53/64
9/64	32	.110	35	7/8	14	.805	13/16
5/32	40	.132	30	7/8	12	.794	51/64
5/32	36	.129	30	7/8	9	.767	49/64
5/32	32	.126	1/8	15/16	12	.856	55/64
11/64	36	.145	27	15/16	9	.829	53/64
11/64	32	.141	9/64	1	27	.964	31/32
3/16	36	.161	20	1	14	.930	15/16
3/16	32	.157	22	1	12	.919	59/64
3/16	30	.155	23	1	8	.878	7/8
3/16	24	.147	26	1 1/16	8	.941	15/16
13/64	32	.173	17	1 1/8	12	1.044	1 3/64
13/64	30	.171	11/64	1 1/8	7	.986	63/64
13/64	24	.163	20	1 3/16	7	1.048	1 3/64
7/32	32	.188	12	1 1/4	12	1.169	1 11/64
7/32	28	.184	13	1 1/4	7	1.111	1 7/64
7/32	24	.178	16	1 5/16	7	1.173	1 11/64
15/64	32	.204	6	1 3/8	12	1.294	1 19/64
15/64	28	.200	8	1 3/8	6	1.213	1 7/32
15/64	24	.194	10	1 1/2	12	1.419	1 27/64
1/4	32	.220	7/32	1 1/2	6	1.338	1 11/32
1/4	28	.215	3	1 5/8	5 1/2	1.448	1 29/64
1/4	27	.214	3	1 3/4	5	1.555	1 9/16
1/4	24	.209	4	1 7/8	5	1.680	1 11/16
1/4	20	.201	7	2	4 1/2	1.783	1 25/32
5/16	32	.282	9/32	2 1/8	4 1/2	1.909	1 29/32
5/16	27	.276	J	2 1/4	4 1/2	2.034	2 1/32
5/16	24	.272	I	2 3/8	4	2.131	2 1/8
5/16	20	.264	17/64	2 1/2	4	2.256	2 1/4
5/16	18	.258	F	2 5/8	4	2.381	2 3/8
3/8	27	.339	R	2 3/4	4	2.506	2 1/2
3/8	24	.334	Q	2 7/8	3 1/2	2.597	2 19/32
3/8	20	.326	21/64	3	3 1/2	2.722	2 23/32
3/8	16	.314	5/16	3 1/8	3 1/2	2.847	2 27/32
7/16	27	.401	Y	3 1/4	3 1/2	2.972	2 31/32
7/16	24	.397	X	3 3/8	3 1/4	3.075	3 1/16
7/16	20	.389	25/64	3 1/2	3 1/4	3.200	3 3/16
7/16	14	.368	U	3 5/8	3 1/4	3.325	3 5/16
1/2	27	.464	15/32	3 3/4	3	3.425	3 7/16
1/2	24	.460	29/64	4	3	3.675	3 11/16

Double Depth of Screw Threads

$$D.D. = \frac{1.732}{N}$$ For V Thread

$$D.D. = \frac{1.299}{N}$$ For American Nat. Form, U. S. Std.

$$D.D. = \frac{1.28}{N}$$ For Whitworth Standard

Threads per Inch N	V Threads D.D.	Am. Nat. Form D.D. U.S. Std.	Whitworth Standard D.D.	Threads per Inch N	V Threads D.D.	Am. Nat. Form D.D. U.S. Std.	Whitworth Standard D.D.
2	.86600	.64950	.64000	28	.06185	.04639	.04571
2¼	.76978	.57733	.56888	30	.05773	.04330	.04266
2⅜	.72926	.54694	.53894	32	.05412	.04059	.04000
2½	.69280	.51960	.51200	34	.05094	.03820	.03764
2⅝	.65981	.49485	.48761	36	.04811	.03608	.03555
2¾	.62982	.47236	.46545	38	.04558	.03418	.03368
2⅞	.60243	.45182	.44521	40	.04330	.03247	.03200
3	.57733	.43300	.42666	42	.04124	.03093	.03047
3¼	.53292	.39966	.39384	44	.03936	.02952	.02909
3½	.49485	.37114	.36571	46	.03765	.02823	.02782
4	.43300	.32475	.32000	48	.03608	.02706	.02666
4½	.38488	.28869	.28444	50	.03464	.02598	.02560
5	.34640	.25980	.25600	52	.03331	.02498	.02461
5½	.31490	.23618	.23272	54	.03207	.02405	.02370
6	.28866	.21650	.21333	56	.03093	.02319	.02285
7	.24742	.18557	.18285	58	.02986	.02239	.02206
8	.21650	.16237	.16000	60	.02887	.02165	.02133
9	.19244	.14433	.14222	62	.02794	.02095	.02064
10	.17320	.12990	.12800	64	.02706	.02029	.02000
11	.15745	.11809	.11636	66	.02624	.01968	.01939
11½	.15061	.11295	.11130	68	.02547	.01910	.01882
12	.14433	.10825	.10666	70	.02474	.01855	.01829
13	.13323	.09992	.09846	72	.02406	.01804	.01778
14	.12371	.09278	.09142	74	.02341	.01752	.01729
15	.11547	.08660	.08533	76	.02279	.01714	.01684
16	.10825	.08118	.08000	78	.02221	.01665	.01641
18	.09622	.07216	.07111	80	.02165	.01623	.01600
20	.08660	.06495	.06400	82	.02112	.01584	.01560
22	.07872	.05904	.05818	84	.02062	.01546	.01523
24	.07216	.05412	.05333	86	.02014	.01510	.01488
26	.06661	.04996	.04923	88	.01968	.01476	.01454
27	.06415	.04811	.04740	90	.01924	.01443	.01422

Pitch Diameter Tables

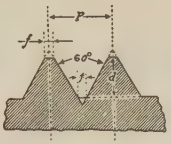
For Nos. 575 and 585 Screw Thread Micrometers

Whitworth Standard

Caliper Reading or Pitch Diameter

for Whitworth Threads = $D - \frac{.640}{N}$

Diameter Inches	Threads per Inch	Caliper Reading or Pitch Diameter	Single Depth of Thread
D	N	$D - \frac{.640}{N}$	$\frac{.640}{N}$
...	48	.....	.0133
...	46	.....	.0139
...	44	.....	.0146
...	42	.....	.0152
...	40	.....	.0160
...	38	.....	.0168
...	36	.....	.0178
...	34	.....	.0188
...	32	.....	.0200
...	30	.....	.0213
...	28	.....	.0229
...	26	.....	.0246
...	24	.....	.0267
...	22	.....	.0291
1/4	20	.2180	.0320
5/16	18	.2769	.0355
3/8	16	.3350	.0400
7/16	14	.3918	.0457
1/2	12	.4467	.0533
9/16	12	.5092	.0533
5/8	11	.5668	.0582
11/16	11	.6293	.0582
3/4	10	.6860	.0640
13/16	10	.7485	.0640
7/8	9	.8039	.0711
15/16	9	.8664	.0711
1	8	.9200	.0800
1 1/8	7	1.0336	.0914
1 1/4	7	1.1586	.0914
1 3/8	6	1.2684	.1066
1 1/2	6	1.3934	.1066
1 5/8	5	1.4970	.1280
1 3/4	5	1.6220	.1280
1 7/8	4 1/2	1.7328	.1422
2	4 1/2	1.8578	.1422
2 1/8	4 1/2	1.9828	.1422



Metric Standard

p = pitch = $\frac{1}{\text{No. of threads per inch}}$

d = depth = pitch x .6495 **f = flat = $\frac{\text{pitch}}{8}$**

Size mm	Pitch	
	I.S.O.	French Std.
2	.45	.50
3	.55	.50
4	.70	.75
5	.85	.75
6	1.00	1.00
7	1.00	1.00
8	1.25	1.00
9	1.25	1.00
10	1.50	1.50
11	1.50	....
12	1.75	1.50
14	2.00	2.00
16	2.00	2.00
18	2.50	2.50
20	2.50	2.50
22	2.50	2.50
24	3.00	3.00
26	....	3.00
27	3.00	....
28	....	3.00
30	3.50	3.50
32	....	3.50
33	3.50	3.50
34	....	3.50
36	4.00	4.00
38	....	4.00
39	4.00	....
40	....	4.00

Pitch Diameter Table

For Nos. 575 and 585 Screw Thread Micrometers

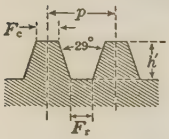
"V" Standard Thread Form

Caliper Reading or Pitch Diameter for "V" Threads = $D - \frac{.866}{N}$ A.

Diameter Inches D	Threads per Inch N	Caliper Reading or Pitch Diameter $D - \frac{.866}{N}$	Single Depth of Thread $\frac{.866}{N}$	Diameter Inches* D	Threads per Inch N	Caliper Reading or Pitch Diameter $D - \frac{.866}{N}$	Single Depth of Thread $\frac{.866}{N}$
Note:—As there is no standard of diameter for the finer pitches this column is left blank.	64	....	.0135	1/4	24	.2139	.0361
	62	....	.0140	1/4	20	.2067	.0433
	60	....	.0144	5/16	20	.2692	.0433
	58	....	.0149	5/16	18	.2644	.0481
	56	....	.0155	3/8	18	.3269	.0481
	54	....	.0161	3/8	16	.3209	.0541
	52	....	.0167	7/16	16	.3834	.0541
	50	....	.0173	7/16	14	.3756	.0619
	48	....	.0180	1/2	14	.4381	.0619
	46	....	.0188	1/2	13	.4334	.0666
	44	....	.0197	1/2	12	.4278	.0722
	42	....	.0206	9/16	14	.5006	.0619
	40	....	.0217	9/16	12	.4903	.0722
	38	....	.0228	5/8	11	.5463	.0787
	36	....	.0241	5/8	10	.5384	.0866
	34	....	.0255	11/16	10	.6009	.0866
	32	....	.0271	3/4	10	.6634	.0866
	30	....	.0289	7/8	9	.7788	.0962
	28	....	.0309	1	8	.8918	.1082
	26	....	.0333	1 1/8	8	1.0168	.1082
	..	....	....	1 1/4	7	1.1263	.1237
	..	....	....	1 1/2	6	1.3557	.1443

*These figures give the outside diameter for screws with threads cut theoretically sharp. As it is not practical to make these threads sharp, the outside diameter will measure less than the figures given, the pitch diameter remaining the same.

American Standard Acme Screw Thread Dimensions



h = Basic depth of thread
h' = Depth of thread with clearance
K = Tap drill / Basic minor diameter of nut
Fc = Width of flat at crest of thread
Fr = Width of flat at bottom of space

n = Number of threads per inch
p = Pitch of thread
Kr = Minor diameter of screw
D = Major diameter of screw
T = Major diameter of tap

$p = \frac{1}{n}$

K = D minus p

$Fc = \frac{.3707}{n}$

Kr = D minus 2h'

For 10 or less threads per inch

$h' = \frac{P}{2}$ plus .010

$Fr = \frac{.3707}{n}$ minus .0052

T = D plus .020

For more than 10 threads per inch

$h' = \frac{P}{2}$ plus .005

$Fr = \frac{.3707}{n}$ minus .0026

T = D plus .010

Threads per inch (n)	Depth of Thread with Clearance (h')	Flat at Top of Thread (Fc)	Flat at Bottom of Space (Fr)	Space at Top of Thread	Thickness at Root of Thread
1	.5100	.3707	.3655	.6293	.6345
1 1/8	.3850	.2780	.2728	.4720	.4772
2	.2600	.1854	.1802	.3146	.3198
3	.1767	.1236	.1184	.2097	.2149
4	.1350	.0927	.0875	.1573	.1625
5	.1100	.0741	.0689	.1259	.1311
6	0933	.0618	.0566	.1049	.1101
7	.0814	.0530	.0478	.0899	.0951
8	.0725	.0463	.0411	.0787	.0839
9	.0655	.0412	.0360	.0699	.0751
10	.0600	.0371	.0319	.0629	.0681
12	.0467	.0309	.0283	.0524	.0550
14	.0407	.0265	.0239	.0449	.0475
16	.0363	.0232	.0206	.0393	.0419

Different Standards for Wire Gages in use in the United States

Dimensions of Sizes in Decimal Parts of an Inch

	Starrett Wire Gage Catalog Numbers							
	No. 281 No. 282	No. 188 No. 189	No. 287	.....	No. 295 No. 280	.....	No. 283	
Number of Wire Gage	American or Brown & Sharpe	Birmingham or Stubs' Iron Wire	Washburn & Moen, Worcester, Mass.	W. & M. Steel Music Wire	American S. & W. Co's. Music Wire Gage	Stubs' Steel Wire	U.S. Standard Gage for Sheet and Plate Iron and Steel	Number of Wire Gage
00000000	.....	.....	.....	.0083	.....	.....	.....	00000000
0000000	.....	.....	.....	.0087	.....	.....	.....	0000000
000000	.....	.....	.....	.0095	.004	.....	.46875	000000
00000	.....	.....	.....	.010	.005	.....	.4375	00000
0000	.460	.454	.3938	.011	.006	.....	.40625	0000
000	.40964	.425	.3625	.012	.007	.....	.375	000
00	.3648	.380	.3310	.0133	.008	.....	.34375	00
0	.32486	.340	.3065	.0144	.009	.....	.3125	0
1	.2893	.300	.2830	.0156	.010	.227	.28125	1
2	.25763	.284	.2625	.0166	.011	.219	.265625	2
3	.22942	.259	.2437	.0178	.012	.212	.250	3
4	.20431	.238	.2253	.0188	.013	.207	.234375	4
5	.18194	.220	.2070	.0202	.014	.204	.21875	5
6	.16202	.203	.1920	.0215	.016	.201	.203125	6
7	.14428	.180	.1770	.023	.018	.199	.1875	7
8	.12849	.165	.1620	.0243	.020	.197	.171875	8
9	.11443	.148	.1483	.0256	.022	.194	.15625	9
10	.10189	.134	.1350	.027	.024	.191	.140625	10
11	.090742	.120	.1205	.0284	.026	.188	.125	11
12	.080808	.109	.1055	.0296	.029	.185	.109375	12
13	.071961	.095	.0915	.0314	.031	.182	.09375	13
14	.064084	.083	.0800	.0326	.033	.180	.078125	14
15	.057068	.072	.0720	.0345	.035	.178	.0703125	15
16	.05082	.065	.0625	.036	.037	.175	.0625	16
17	.045257	.058	.0540	.0377	.039	.172	.05625	17
18	.040303	.049	.0475	.0395	.041	.168	.050	18
19	.03589	.042	.0410	.0414	.043	.164	.04375	19
20	.031961	.035	.0348	.0434	.045	.161	.0375	20
21	.028462	.032	.03175	.046	.047	.157	.034375	21
22	.025347	.028	.0286	.0483	.049	.155	.03125	22
23	.022571	.025	.0258	.051	.051	.153	.028125	23
24	.0201	.022	.0230	.055	.055	.151	.025	24
25	.0179	.020	.0204	.0586	.059	.148	.021875	25
26	.01594	.018	.0181	.0626	.063	.146	.01875	26
27	.014195	.016	.0173	.0658	.067	.143	.0171875	27
28	.012641	.014	.0162	.072	.071	.139	.015625	28
29	.011257	.013	.0150	.076	.075	.134	.0140625	29
30	.010025	.012	.0140	.080	.080	.127	.0125	30
31	.008928	.010	.0132	.....	.085	.120	.0109375	31
32	.00795	.009	.0128	.....	.090	.115	.01015625	32
33	.00708	.008	.0118	.....	.095	.112	.009375	33
34	.006304	.007	.0104	.....	.....	.110	.00859375	34
35	.005614	.005	.0095	.....	.....	.108	.0078125	35
36	.005	.004	.0090	.....	.....	.106	.00703125	36
37	.004453	.....	.....	.....	.....	.103	.006640625	37
38	.003965	.....	.....	.....	.....	.101	.00625	38
39	.003531	.....	.....	.....	.....	.099	.....	39
40	.003144	.....	.....	.....	.....	.097	.....	40

Allowances for Fits

Tolerances in Standard Holes★

Class	Nominal Diameters	Up to ½ Inch	⅝–1 Inch	1⅛–2 Inches	2⅛–3 Inches	3⅛–4 Inches	4⅛–5 Inches
A	High Limit	+0.00025	+0.0005	+0.00075	+0.0010	+0.0010	+0.0010
	Low Limit	−0.00025	−0.00025	−0.00025	−0.0005	−0.0005	−0.0005
	Tolerance	0.0005	0.00075	0.0010	0.0015	0.0015	0.0015
B	High Limit	+0.0005	+0.00075	+0.0010	+0.00125	+0.0015	+0.00175
	Low Limit	−0.0005	−0.0005	−0.0005	−0.00075	−0.00075	−0.00075
	Tolerance	0.0010	0.00125	0.0015	0.0020	0.00225	0.0025
Allowances for Forced Fits							
F	High Limit	+0.0010	+0.0020	+0.0040	+0.0060	+0.0080	+0.0100
	Low Limit	+0.0005	+0.0015	+0.0030	+0.0045	+0.0060	+0.0080
	Tolerance	0.0005	0.0005	0.0010	0.0015	0.0020	0.0020
Allowances for Driving Fits							
D	High Limit	+0.0005	+0.0010	+0.0015	+0.0025	+0.0030	+0.0035
	Low Limit	+0.00025	+0.00075	+0.0010	+0.0015	+0.0020	+0.0025
	Tolerance	0.00025	0.00025	0.0005	0.0010	0.0010	0.0010
Allowances for Push Fits							
P	High Limit	−0.00025	−0.00025	−0.00025	−0.0005	−0.0005	−0.0005
	Low Limit	−0.00075	−0.00075	−0.00075	−0.0010	−0.0010	−0.0010
	Tolerance	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Allowances for Running Fits★★							
X	High Limit	−0.0010	−0.00125	−0.00175	−0.0020	−0.0025	−0.0030
	Low Limit	−0.0020	−0.00275	−0.0035	−0.00425	−0.0050	−0.00575
	Tolerance	0.0010	0.0015	0.00175	0.00225	0.0025	0.00275
Y	High Limit	−0.00075	−0.0010	−0.00125	−0.0015	−0.0020	−0.00225
	Low Limit	−0.00125	−0.0020	−0.0025	−0.0030	−0.0035	−0.0040
	Tolerance	0.0005	0.0010	0.00125	0.0015	0.0015	0.00175
Z	High Limit	−0.0005	−0.00075	−0.00075	−0.0010	−0.0010	−0.00125
	Low Limit	−0.00075	−0.00125	−0.0015	−0.0020	−0.00225	−0.0025
	Tolerance	0.00025	0.0005	0.00075	0.0010	0.00125	0.00125

Formulas for Determining Allowances

Class	High Limit	Low Limit	Class	High Limit	Low Limit
A	$+\sqrt{D}\times 0.0006$	$-\sqrt{D}\times 0.0003$	X	$-\sqrt{D}\times 0.00125$	$-\sqrt{D}\times 0.0025$
B	$+\sqrt{D}\times 0.0008$	$-\sqrt{D}\times 0.0004$	Y	$-\sqrt{D}\times 0.001$	$-\sqrt{D}\times 0.0018$
P	$-\sqrt{D}\times 0.0002$	$-\sqrt{D}\times 0.0006$	Z	$-\sqrt{D}\times 0.0005$	$-\sqrt{D}\times 0.001$

★Tolerance is provided for holes, which ordinary standard reamers can produce, in two grades, Classes A and B, the selection of which is a question for the user's decision and dependent upon the quality of the work required; some prefer to use Class A as working limits and Class B as inspection limits.

★★Running fits, which are the most commonly required, are divided into three grades: Class X, for engine and other work where easy fits are wanted; Class Y, for high speeds and good average machine work; Class Z, for fine tool work.

Tapers and Angles

Taper per Foot	Included Angle			Angle With Center Line			Taper per Inch	Taper per Inch from Center Line
	Deg.	Min.	Sec.	Deg.	Min.	Sec.		
1/8	0	35	47	0	17	54	.010416	.005208
3/16	0	53	44	0	26	52	.015625	.007812
1/4	1	11	38	0	35	49	.020833	.010416
5/16	1	29	31	0	44	46	.026042	.013021
3/8	1	47	25	0	53	42	.031250	.015625
7/16	2	5	18	1	2	39	.036458	.018229
1/2	2	23	12	1	11	36	.041667	.020833
9/16	2	41	7	1	20	34	.046875	.023438
5/8	2	59	3	1	29	31	.052084	.026042
11/16	3	16	56	1	38	28	.057292	028646
3/4	3	34	48	1	47	24	.062500	.031250
13/16	3	52	42	1	56	21	.067708	.033854
7/8	4	10	32	2	5	16	.072917	.036456
15/16	4	28	26	2	14	13	.078125	.039063
1	4	46	19	2	23	10	.083330	.041667
1 1/4	5	57	45	2	58	53	.104166	.052084
1 1/2	7	9	10	3	34	35	.125000	.062500
1 3/4	8	20	28	4	10	14	.145833	.072917
2	9	31	37	4	45	49	.166666	.083332
2 1/2	11	53	38	5	56	49	.208333	.104166
3	14	2	0	7	1	0	.250000	.125000
3 1/2	16	35	39	8	17	49	.291666	.145833
4	18	55	31	9	27	44	.333333	.166666
4 1/2	21	14	20	10	37	10	.375000	.187500
5	23	32	12	11	46	6	.416666	.208333
6	28	4	20	14	2	10	.500000	.250000

Suggested Cutting Speeds and Feeds for Drills

The following information is a good general guide. Specific jobs may have to be modified because of varying conditions on the job, such as coolant, equipment, and job requirements.

Drill feeds are governed by the size of the drill and also the material to be drilled; a feed of .001 to .002″ per revolution for drills smaller than ⅛″, .002 to .004″ for drills ⅛ to ¼″, .004 to .007″ for drills ¼ to ½″, .007 to .015″ for drills ½ to 1″, and .015 to .025″ for drills larger than 1″ are recommended. The lower feeds should be used when drilling relatively hard materials such as alloy steels and the higher feeds should be used when drilling relatively soft materials such as aluminum and brass.

These feeds are based on the peripheral speed of a drill. Recommended approximate peripheral speeds for carbon steel twist drills are as follows: 30 feet per minute for machinery steel; 35 feet per minute for cast iron; 60 feet per minute for brass. Recommended approximate peripheral speeds for high speed steel drills are: 80 feet per minute for machinery steel, 100 feet per minute for cast iron; 50 feet per minute for alloy steel, and 200 feet per minute for brass.

Drill Diam., Inches	FEET PER MINUTE										
	30	40	50	60	70	80	90	100	150	200	250
	REVOLUTIONS PER MINUTE										
1/16	1833	2445	3056	3667	4278	4889	5500	6112	9167	12223	15279
1/8	917	1222	1528	1833	2139	2445	2750	3056	4584	6112	7639
3/16	611	815	1019	1222	1426	1630	1833	2037	3056	4074	5093
1/4	458	611	764	917	1070	1222	1375	1528	2292	3056	3820
5/16	367	489	611	733	856	978	1100	1222	1833	2445	3056
3/8	306	407	509	611	713	815	917	1019	1528	2037	2546
7/16	262	349	437	524	611	698	786	873	1310	1746	2183
1/2	229	306	382	458	535	611	688	764	1146	1528	1910
9/16	183	244	306	367	428	489	550	611	917	1222	1528
3/4	153	204	255	306	357	407	458	509	764	1019	1273
7/8	131	175	218	262	306	349	393	473	655	873	1091
1	115	153	191	229	267	306	344	382	573	764	955
1 1/8	102	136	170	204	238	272	306	340	509	679	849
1 1/4	92	122	153	183	214	244	275	306	458	611	764
1 3/8	83	111	139	167	194	222	250	278	417	556	694
1 1/2	76	102	127	153	178	204	229	255	382	509	637
1 5/8	71	94	118	141	165	188	212	235	353	470	588
1 3/4	66	87	109	131	153	175	196	218	327	437	546
1 7/8	61	82	102	122	143	163	183	204	306	407	509
2	57	76	96	115	134	153	172	191	287	382	477
2 1/4	51	68	85	102	119	136	153	170	255	340	424
2 1/2	46	61	76	92	107	122	138	153	229	306	382
2 3/4	42	56	70	83	97	111	125	139	208	278	347
3	38	51	64	76	89	102	115	127	191	255	318
3 1/4	35	47	59	71	82	94	106	118	176	235	294
3 1/2	33	44	55	66	76	87	98	109	164	218	273
3 3/4	31	41	51	61	71	81	92	102	153	204	255
4	29	38	48	57	67	76	86	96	143	191	239
4 1/2	26	34	42	51	59	68	76	85	127	170	212
5	23	31	38	46	54	61	69	76	115	153	191
5 1/2	21	28	35	42	49	56	63	70	104	139	174
6	19	26	32	38	45	51	57	64	96	127	159
6 1/2	18	24	29	35	41	47	53	59	88	118	147
7	16	22	27	33	38	44	49	55	82	109	136
7 1/2	15	20	26	31	36	41	46	51	76	102	127
8	14	19	24	29	33	38	43	48	72	96	119

Weight of Steel Bars

Weight in Pounds of a Lineal Foot of Round, Hexagon, and Square Steel Bars

Size in Inches	Round	Hexagon	Square	Size in Inches	Round	Hexagon	Square
1/4	.167	.184	.213	1 1/2	6.01	6.63	7.65
5/16	.261	.288	.332	1 5/8	7.05	7.78	8.98
3/8	.376	.414	.478	1 3/4	8.18	9.02	10.41
7/16	.511	.564	.651	1 7/8	9.39	10.35	11.95
1/2	.668	.736	.850	2	10.68	11.78	13.60
9/16	.845	.932	1.08	2 1/2	16.69	18.40	21.25
5/8	1.04	1.15	1.33	2 5/8	18.40	20.29	23.43
11/16	1.26	1.39	1.61	2 3/4	20.19	22.27	25.71
3/4	1.50	1.66	1.91	3	24.03	26.50	30.60
7/8	2.04	2.25	2.60	3 1/4	28.21	31.10	35.91
1	2.67	2.94	3.40	3 1/2	32.71	36.07	41.65
1 1/8	3.38	3.73	4.30	3 3/4	37.55	41.41	47.81
1 1/4	4.17	4.60	5.31	4	42.73	47.11	54.40
1 3/8	5.05	5.57	6.43				

Weight of Sheet Steel

United States Standard Gage

Gage Number	Approx. Thickness	Pounds per Sq. Foot	Gage Number	Approx. Thickness	Pounds per Sq. Foot
7	.188	7.500	18	.050	2.000
8	.172	6.875	19	.044	1.750
9	.156	6.250	20	.038	1.500
10	.141	5.625	21	.034	1.375
11	.125	5.000	22	.031	1.250
12	.109	4.375	23	.028	1.125
13	.094	3.750	24	.025	1.000
14	.078	3.125	25	.022	.875
15	.070	2.812	26	.019	.750
16	.063	2.500	27	.017	.687
17	.056	2.250	28	.016	.625

High Temperatures Judged by Color, and Colors for Tempering

Degrees Centigrade	Degrees Fahrenheit	High Temperatures Judged by Color	Degrees Centigrade	Degrees Fahrenheit	Colors for Tempering
400	752	Red heat, visible in the dark	221.1	430	Very pale yellow
474	885	Red heat, visible in twilight	226.7	440	Light yellow
525	975	Red heat, visible in daylight	232.2	450	Pale straw-yellow
581	1077	Red heat, visible in sunlight	237.8	460	Straw-yellow
700	1292	Dark red	243.3	470	Deep straw-yellow
800	1472	Dull cherry-red	248.9	480	Dark yellow
900	1652	Cherry-red	254.4	490	Yellow-brown
1000	1832	Bright cherry-red	260.0	500	Brown-yellow
1100	2012	Orange-red	265.6	510	Spotted red-brown
1200	2192	Orange-yellow	271.1	520	Brown-purple
1300	2372	Yellow-white	276.7	530	Light purple
1400	2552	White welding heat	282.2	540	Full purple
1500	2732	Brilliant white	287.8	550	Dark purple
1600	2912	Dazzling white (bluish-white)	293.3	560	Full blue
			298.9	570	Dark blue

Temperature Conversion

Use this table to convert Fahrenheit degrees (F°) directly to Celsius degrees (C°) and vice versa. It covers the range of temperatures used in most hardening, tempering and annealing operations.

Lower, higher and intermediate conversions can be made by substituting a known Fahrenheit (F°) or Celsius (C°) temperature figure in either of the following formulas.

$$F° = \frac{C° \times 9}{5} + 32$$

$$C° = \frac{F° - 32}{9} \times 5$$

F°	C°	F°	C°	F°	C°	F°	C°	F°	C°
— 160	— 107	340	171	840	449	1340	727	1840	1004
— 140	— 96	360	182	860	460	1360	738	1860	1016
— 120	— 84	380	193	880	471	1380	749	1880	1027
— 100	— 73	400	204	900	482	1400	760	1900	1038
— 80	— 62	420	216	920	493	1420	771	1920	1049
— 60	— 51	440	227	940	504	1440	782	1940	1060
— 40	— 40	460	238	960	516	1460	793	1960	1071
— 20	— 29	480	249	980	527	1480	804	1980	1082
0	— 18	500	260	1000	538	1500	816	2000	1093
20	— 7	520	271	1020	549	1520	827	2020	1104
40	4	540	282	1040	560	1540	838	2040	1116
60	16	560	293	1060	571	1560	849	2060	1127
80	27	580	304	1080	582	1580	860	2080	1138
100	38	600	316	1100	593	1600	871	2100	1149
120	49	620	327	1120	604	1620	882	2120	1160
140	60	640	338	1140	616	1640	893	2140	1171
160	71	660	349	1160	627	1660	904	2160	1182
180	82	680	360	1180	638	1680	916	2180	1193
200	93	700	371	1200	649	1700	927	2200	1204
220	104	720	382	1220	660	1720	938	2220	1216
240	116	740	393	1240	671	1740	949	2240	1227
260	127	760	404	1260	682	1760	960	2260	1238
280	138	780	416	1280	693	1780	971	2280	1249
300	149	800	427	1300	704	1800	982	2300	1260
320	160	820	438	1320	716	1820	993	2320	1271

Rules Relative to the Circle

To Find Circumference—
Multiply diameter by 3.1416 ..... Or divide diameter by 0.3183

To Find Diameter—
Multiply circumference by 0.3183 ..... Or divide circumference by 3.1416

To Find Radius—
Multiply circumference by 0.15915 ..... Or divide circumference by 6.28318

To Find Side of an Inscribed Square—
Multiply diameter by 0.7071
Or multiply circumference by 0.2251 ..... Or divide circumference by 4.4428

To Find Side of an Equal Square—
Multiply diameter by 0.8862 ..... Or divide diameter by 1.1284
Or multiply circumference by 0.2821 ..... Or divide circumference by 3.545

Square—
A side multiplied by 1.4142 equals diameter of its circumscribing circle.
A side multiplied by 4.443 equals circumference of its circumscribing circle.
A side multiplied by 1.128 equals diameter of an equal circle.
A side multiplied by 3.547 equals circumference of an equal circle.

To Find the Area of a Circle—
Multiply circumference by one-quarter of the diameter.
Or multiply the square of diameter by 0.7854
Or multiply the square of circumference by .07958
Or multiply the square of ½ diameter by 3.1416

To Find the Surface of a Sphere or Globe—
Multiply the diameter by the circumference.
Or multiply the square of diameter by 3.1416
Or multiply four times the square of radius by 3.1416

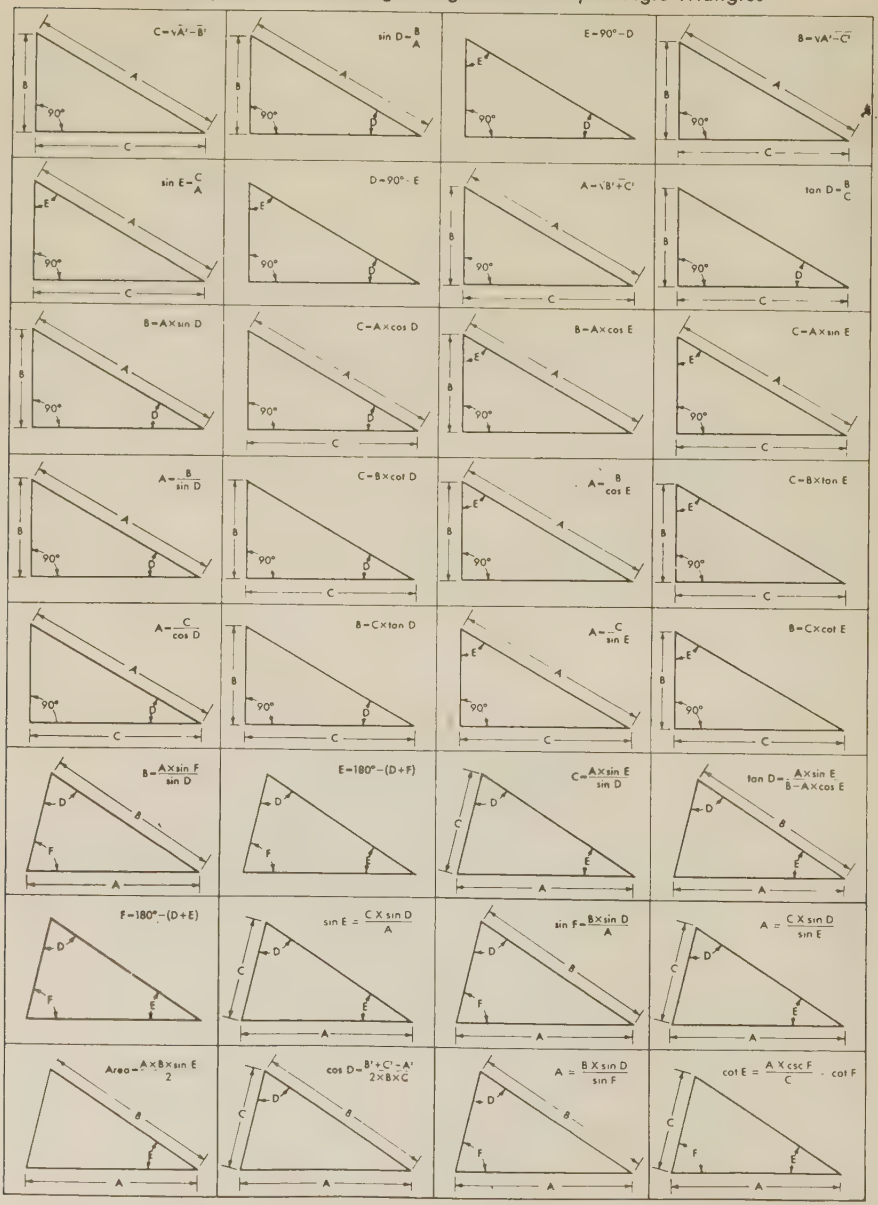
Lubricants for Cutting Tools

Material	Turning	Chucking	Drilling Milling	Reaming	Tapping
Tool Steel	Dry or Oil	Oil or Soda Water	Oil	Lard Oil	Oil
Soft Steel	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Wrought Iron	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Cast Iron	Dry	Dry	Dry	Dry	Oil
Brass	Dry	Dry	Dry	Dry	Oil
Copper	Dry	Oil	Oil	Mixture	Oil
Babbitt	Dry	Dry	Dry	Dry	Oil
Glass			Turpentine or	Kerosene	

Mixture is ⅓ Crude Petroleum, ⅔ Lard Oil. When two lubricants are mentioned the first is preferable.

Triangle Chart

For the Rapid Solution of Right-Angle and Oblique-Angle Triangles



Courtesy Industrial Press

Metric Tools

DESCRIPTION	PAGE
Adjustable Parallels	150
Attachments	
Outside Micrometer	30
Vernier Height Gage	106
Bench Micrometer	68-70
Bevel Protractor	151, 160
Blades	163
Bore Gages, Dial	345-347
Calipers	
Dial	92
Electronic Digital	90
Pocket Slide	122
Vernier	96, 97
Vernier Gear Tooth	112
Center Gage	192
Combination Sets	151, 156-159
Blades	163
Combination Squares	151-155
Blades	163
Coordinate Measuring Machines	419-434
Crankshaft Distortion Dial Gage or Strain Gage	352, 353
Cylinder Gage	350
Depth Gages	
Dial	349
Digital Micrometer	87
Micrometer	84-86
Vernier	113
Dial Caliper	92
Dial Gages	
Bench	344
Bore	345-347
Comparator	343
Crankshaft Distortion	352, 353
Cylinder	350
Depth	349
Diameter	360-363
Groove	354, 355
Hand	348
Inside	351
Out-of-Roundness	351
Pocket	348
Sheet	347
Snap	356, 357
Vibrometer	350
Dial Indicators	
AGD Information	292, 293
AGD Type	296
Dimensions	298, 302, 305, 308
Features	292, 293
Intermediate Range	309
Long Range	310-312
Magnetic Base Holders	335-339
Set	302
Specifications	296
Split Bushing	318
Tester	321
Dial Test Indicators	
Cast Iron Base	341, 342
Granite Base	342
Last Word	326-329
Magnetic Base	337, 339
Universal	331, 332
Diameter Gages, Dial	360-363

DESCRIPTION	PAGE
Digi-Chek Height Gages	107, 108
Accessories	109
Digi-Chek II Height Masters	394, 395
Accessories	395
Digital Micrometers	18, 19
Disc Type Micrometers	24
Edge Finder	228
Educational and Vocational Material	497-507
Electronic Gage	322-325
End Measuring Rods	71-73
Engineers' Taper, Wire and Thickness Gage	208
Film Loops	499-503
Gage Blocks	
General Information	366, 367
Inspection Service	397, 398
New Standards of Accuracy	366
Rectangular Style Sets (1 and 2 mm Base)	
Croblox (Chrome Carbide)	380, 381
Steel	380, 382
Mini-Metric Set	380
Accessories	379
Square Style Sets (2 mm Base)	
Croblox (Chrome Carbide)	380, 383
Steel	380, 382
Accessories	379
Gear Tooth Vernier Caliper	112
Gages	
Center	192
Crankshaft Distortion or Strain	352, 353
Cylinder	350
Dial Bench	344
Dial Bore	345-347
Dial Comparator	343
Dial Depth	349
Dial Diameter	360-363
Dial Groove	354, 355
Dial Hand	348
Dial Indicator Pocket	348
Dial Sheet	347
Dial Snap	356, 357
Digi-Chek Height	107, 108
Digi-Chek II Height Master	394, 395
Electronic	322-325
Engineers' Taper, Wire and Thickness	208
Inside Dial	351
Inside Micrometer	74-82
Micrometer Depth	84-87
Out-of-Roundness	351
Planer and Shaper	182-185
Portable Dial Hand	348
Radius	197-199
Rule Depth	114
Screw Pitch	195, 196
Small Hole	117-119
Strain	352, 353
Taper	208, 209
Telescoping	120, 121
Thickness	201, 203-207
Universal Precision	182, 183
Vernier Depth	113
Vernier Height	101-105
Vibration	350

DESCRIPTION	PAGE
Hacksaw Blades for Kasto Machines	477
Heavy Duty Micrometers	27, 33
Holders, Magnetic Base Indicator	335-340
Hole Gages, Small	117-119
Hole Saws	
Carbide Grit	479, 481
Diamond	479, 481
Kits	480
Safe-Flex Regular	479-481
Speed Table	484
Indicator Holders, Magnetic Base	335-340
Indicators—See Dial Indicators, Dial Test Indicators	
Inside Dial Gages	351
Inside Micrometers	74-82
Last Word	
Dial Test Indicators	326-329
Electronic Gages	322-325
Magnetic Base Indicator Holders	335-340
Micrometer Depth Gages	84-87
Micrometer Heads	57, 58, 60, 62-67
Micrometer Heads, Digital	60
Micrometers, Inside	74-82
Micrometers, Outside	
Attachments	30
Bench	68-70
with Black Enamel Frame	36-40, 42, 43
Checking Disc	28, 29
Digital	18, 19
Disc Type	24
with Full Satin Chrome Finish	15-24, 27-31
Heavy Duty	27, 33
How to Read (0.01 mm)	12
How to Read (0.002 mm)	13
Mul-T-Anvil	20, 21
Rounded Anvil	53
Screw Thread	49
Sets	44, 45
Sheet Metal	52
Tube	52
V-Anvil	23
Multi-Chek Setting and Measuring Machine	396
Out-of-Roundness Gage	351
Parallels, Adjustable	150
Pin Vises	248, 249
Planer and Shaper Gage	182-185
Plumb Bob, Oil Gaging	287
Pocket Slide Caliper	122
Portable Dial Hand Gages	348
Precision Gage Blocks—See Gage Blocks	
Protractors, Bevel	151, 160
Blades	163
Radius Gages	197-199
Reference Bars, Standard	393
Reference Tables	
English to Metric Conversion	511
Metric and English Conversion (Equivalents)	510
Metric to English Conversion	512
Pitch Diameter	519, 520
Temperature Conversion	526
Rods, End Measuring	71-73
Rounded Anvil Micrometer	53
Rule Depth Gage	114
Rules, Steel	136-138
Graduations, Standard	136, 137
Screw Pitch Gages	195, 196
Screw Thread Micrometers	49
Sets	
Automotive Service	88
Combination	151, 156-159
Dial Indicator	302
Micrometer	44, 45
Tool	88, 89
Sheet Metal Micrometers	52
Squares	
Combination	151-155
Blades	163
Double Steel	169, 170
Hardened Bevel Edge	168
Hardened Steel	167
Standard Reference Bars	393
Steel Rules	136-138
Strain Gage	352, 353
Surface Plates, Granite	
Black	408, 409
Parallels	415
Pink	402-408
Right Angle Blocks	416
Stands	410, 411
Straight Edges	414
Technical Data	400, 401
Toolmakers' Flat	412
Tables—See Reference Tables	
Taper Gages	208, 209
Tapes, Steel Measuring	
Oil Gaging	284-286
Plumb Bob	287
Satin Chrome	280, 281
Special	289
White	282-283
Telescoping Gages	120, 121
Thickness Gage Stock	205-207
Thickness Gages	201, 203, 204
Training Aids	497-507
Tube Micrometers	52
Universal Precision Gage	182, 183
V-Anvil Micrometers	23
Vernier	
Calipers	96, 97
Depth Gages	113
Gear Tooth Caliper	112
Height Gages	101-105
How to Read (50-Division)	94
Vibrometer	350
Vises, Pin	248, 249

Alphabetical Index

DESCRIPTION	PAGE
Angle Gage Blocks	385-387
Attachments	
Combination Square	163, 164
Dial Caliper	92
Last Word Dial Test Indicators	330
Outside Micrometers	30
Rules	146
Spacing—For Automatic Center Punch	236
Speed Indicator	254, 255
Vernier Height Gages	106
Automotive Service Set	88
Ball Points, Divider and Trammels	220
Band Knives	462
Band Saw Blades	
Diamond Coated	459
Flex-Back	455-457
For Portable Band Saw Machines	458
Friction Cutting	457
General Information	460
Meat Cutting	461
Powerband Bearcat	446, 447
Powerband II Bearcat	448
Powerband Varicat	449
Premium	453, 454
Speed-Feed Tables	
Friction Cutting	458
Powerband, High Speed	464-468
Premium, Flex-Back	468-470
Tension Gage	471
Troubleshooting	447
Wood Cutting	460-461
Bench Blocks	251
Bench Micrometers	68-70
Bevels	180
Bevel Protractors	151, 160
Blades	162, 163
Parts	161
Universal	174-176
Blocks, Angle Gage	385-387
Blocks, Gage	366-384
Buttons, Toolmakers'	227
Calipers	
Dial	92
Dial Vernier	275
Electronic Digital	90
"Fay" Inside	211
"Fay" Outside	211
Firm Joint Hermaphrodite	216, 217
Firm Joint Inside	213
Firm Joint Outside	213
Inside Micrometer	74-82
Inside Thread	218
Internal Groove	354, 355
Lock Joint Hermaphrodite	216
Lock Joint Inside	214
Lock Joint Inside Transfer	215
Lock Joint Outside	214
Lock Joint Outside Transfer	215
Outside Thread	218
Pocket Slide	122
Pocket Slide Stainless Steel	123
Rolling Mill	191
Toolmakers' Inside	210
Toolmakers' Outside	210
Vernier	96, 97
Vernier Gear Tooth	112
"Yankee" Inside, Outside	212
Cases, Outside Micrometers	38, 43, 44
Center Finder or Wiggler	227
Center Punches	234-238
Automatic	234-236
Spacing	238
Spacing Attachment	236
Chests, Tool	90, 91
Clamps	
Key Seat	146
Rule	146
Toolmakers' Parallel	242
Toolmakers' Steel	241
Combination Sets	151, 156-159
Blades	162, 163
Parts	161
Combination Squares	151-155
Attachments	163, 164
Blades	162, 163
Parts	161
Combination Tool	166
Computer, QC	91
Coordinate Measuring Machines	
Ball Probes	427
Chuck Probe Holder	426
Computation Systems	429-434
Computation System Guide	429
Computers & Software	424
Conical Probes	427
Edge Finder Probes	427
Electronic Probes	426
Probe Qualifiers	426
Rapid Check Accessories	428
Rapid Check Probe Systems	426, 427
RCS Series Systems	422
RCS Specifications	423
Right Angle Probe Adapter	426
Small Probe Set	427
Straight Probes	427
Cut Nippers	256, 257
Dial Calipers	92
Dial Combination Head	75
Dial Gages	
Bore	345-347
Bench	344
Comparator	343
Crankshaft Distortion or Strain	352, 353

DESCRIPTION	PAGE
Cylinder	350
Depth	116, 349
Diameter	358-364
Groove	354, 355
Hand Gages	348
Height	99, 100
Inside	351
Out-of-Roundness	351
Pocket	348
Saw Tension	471
Setting Master for Diameter Gages	360, 362, 363
Sheet	347
Snap	356, 357
Dial Indicators	
AGD Information	292, 293, 296
Anti-Magnetic Mechanism	293
Attachments and Accessories	314-320
Backs	313-315
Balanced Dials	292, 293
Cam Type Lifting Lever	319
Contact Points	316, 317
Contact Point Set	317
Continuous Dials	292, 293
Dial Master	300, 301
Dimensions	298, 302, 305, 308
with Double Row Figures	299
English Reading	296
Features	292, 293
Hole Attachments	315
Intermediate Range	309
Long Range	310-312
Long Stem	319
Magnetic Base Holders	335-339
Maximum Hand	320
Metric Reading	296
Miniature	294
Accessories	295
Dimensions	294
Nonshock Mechanism	316
Range Limit Cap	319
Revolution Counters	293
Roller Contact Point	317
Rubber Dust Guard	320
Set	302
Shock Absorbing Anvil Unit	317
Special Dials	293
Split Bushing	318
Split Collets	318
Tester	321
Threaded Stem	318
Tolerance Hands	320
Top Lift	319
Universal Attachment	315
Dial Indicators, Dial Gages	291-364
Dial Test Indicators	326-334
Heavy Duty	333
Last Word	326-329
Last Word Attachments	330
Magnetic Base	337, 339
Repair Information, Last Word	329
Universal	331, 332

DESCRIPTION	PAGE
Dial Vernier Calipers	275, 276
Differential Measuring Table	390
Digi-Chek Height Gages	107, 108
Accessories	109
Digi-Chek II Height Masters	394, 395
Accessories	395
Digital Height Gage	98
Digital Micrometers	
Depth	87
Heads	60
Outside	18, 19
Dividers	
Extension	219
"Fay"	211
Firm Joint	217
Pencil	220
Toolmakers'	210
"Yankee"	212
Drive Pin Punches	239
Dye, Layout	223
Edge Finders	228
Educational and Vocational Material	497-505
Electronic Gages	322-325
End Measuring Rods	71-73
Films, Educational	499-503
Flat Stock, Ground	
Air Hardening	491-493
Free Machining, Low-Carbon	494, 495
Oil Hardening	487-490
Flex-O-Post Indicator Holder	339
Gages	
Acme Screw Thread	192
Angle	201
Ball and Diameter	200
Center	192
Center Gage Attachment	192
Circumference	123
Crankshaft Distortion or Strain	352, 353
Cutter Clearance	181
Cylinder	350
Depth and Angle	115
Dial Bench	344
Dial Bore	345-347
Dial Comparator	343
Dial Depth	116, 349
Dial Diameter	358-364
Dial Groove	354, 355
Dial Hand	348
Dial Height	99, 100
Dial Indicator Pocket	348
Dial Sheet	347
Dial Snap	356, 357
Digi-Chek Height	107, 108
Digi-Chek II Height Masters	394, 395
Drill	187, 188
Drill Point	186
Electronic	322-325
Engineers'	208

DESCRIPTION	PAGE
Height Transfer	110, 111
Inside Dial	351
Inside Micrometer	74-82
Inspectors'	55
Inspectors' Micrometer Caliper	55
Micrometer Depth	84-87
Out-of-Roundness	351
Piano Tuners'	190
Planer and Shaper	182-185
Portable Dial Hand	348
Protractor and Depth	179
Radius	197-199
Rolling Mill Caliper	191
Rule Depth	114
Scratch	232
Screw and Wire	191
Screw Pitch	195, 196
Sheet Steel	191
Small Hole	117-119
Strain	352, 353
Surface	229-231
Taper	208, 209
Telescoping	120, 121
Thickness	201-204
Thickness or Feeler Stock	205-207
Universal Precision	182, 183
Vernier Depth	113
Vernier Height	101-105
Vibration	350
Wire	188-191
Gage Blocks	
General Information	366, 367
Heavy Duty Style Sets and Accessories	376, 377
Inspection Service	397, 398
New Standards of Accuracy	368
Rectangular Style Sets	
Croblox (chrome carbide)	369
Steel	370
Mini-Metric	380
Combination Croblox-Steel	372
Accessories	378, 379
Square Style Sets	
Croblox (chrome carbide)	373
Steel	374
Combination Croblox-Steel	372
Accessories	378, 379
Gage Block Chamois	391
Gage Block Stones	391
Ground Flat Stock, Precision	485-496
Hacksaws, Band Saws, Hole Saws	444-484
Hacksaw Blades, Hand	
Bluestripe—Bi-Metal	474
Frames	472
Grey-Flex	475
Greenstripe Safe-Flex	474
Redstripe	473
Screw Slotting	475
Hacksaw Blades, Power	
Comparison Chart	478
Greenstripe Safe-Flex	476, 477
Redstripe	476, 477
Redstripe (Kasto)	477
Speed-Feed Table	476
Tensioning Table	471
Hammer, Toolmakers'	233
Height Gage and Depth Gage Set for Combination Squares	164
Height Transfer Gages	110, 111
Hold Downs	241
Holders	
Gage	143, 197
Magnetic Base Indicator	335-340
Thickness Gage	207
Hole Saws	
Accessories	482, 483
Carbide Grit	479, 481
Diamond	479, 481
Kits	480
Safe-Flex	479, 481
Speed Table	484
Indicators—See Dial Indicators, Dial Test Indicators	
Indicator	
Flex-O-Post Holder	339
Holder, Magnetic Base	335-340
Speed	254, 255
"Universal Junior" Test	334
Jack Screws, "Little Giant"	250
Layout Dye	223
Leveling Instruments	271
Leveling Rods and Targets	272
Levels	262-267
M-1 All Purpose Lubricant	225, 226
M-1 Bulk Spray Dispenser	226
Machinists' Vises	436-442
Magnetic Base Indicator Holders	335-340
Mechanics' Hand Measuring Tools and Precision Instruments	5-272
Micrometers, Bench	68-70
Micrometer Depth Gages	84-87
Micrometer Heads	57-67
Micrometer Heads, Non-Rotating Spindle	61
Micrometer Stand	41
Micrometers, Inside	74-82
Micrometers, Internal Groove	82
Micrometers, Outside	
Attachments	30
Bench	68-70
Blade Type	25
Can Curl	56
Can Seam	56
Carbide Faced	9
Cases	38, 43, 44
Crankshaft	32
Digital	18, 19
Disc Type	24
Features	6-9

DESCRIPTION	PAGE
Friction Thimble	9
Groove	26
Heavy Duty	27, 33
Hi-Precision	22
How to Adjust	14
How to Read	10-13
Hub	54
Inspectors'	55
Lock Nut	9
Mul-T-Anvil	20, 21
Paper Gage	54
Quick Adjusting	27
Ratchet Stop	9
Rounded Anvil	53
Screw Thread	49
Screw Thread Comparator	50
Sets	44, 45
Sheet Metal	52
Special	273, 274
Stainless Steel	31
Stand	41
Steel Mill	51
Tube	52
Tubular	46-48
V-Anvil	23
Wire	26
Multi-Chek Setting and Measuring Machine	396
Nail Sets	240
Oil, Tool and Instrument	224
Optical Flats	392
Optical Flat Parallel Sets	392
Optical Polygons	390
Optical Reflecting Targets, Cubes	389
Packaging for Retail Trade	290
Parallels	
Adjustable	150
Steel	149
Pin Vises	248, 249
Plumb Bobs	268
Oil Gaging	287
Precision Ground Flat Stock	485-495
Prick Punches	238
Protractors	
Bevel	151, 160
Steel	177-180
Universal Bevel	174-176
Universal Bevel—How to Read	174
Punches	
Automatic Center	234-236
Center	237, 238
Drive Pin	239
Prick	238
Spacing Center	238
Reference Tables	
Acme Screw Thread Dimensions	520
Allowances for Fits	522
American National and Unified Thread Dimensions and Tap Drill Sizes	515, 516
American Standard Pipe Thread and Tap Drill Sizes	514
Color Temperature Chart	525
Cutting Speeds and Feeds for Drills	524
Decimal Equivalents	
Fractions	513
Letter Size Drills	513
Number Size Drills	514
Double Depth of Screw Threads	518
English to Metric Conversion	511
Lubricants for Cutting Tools	527
Metric and English Conversion	510
Metric to English Conversion	512
Pitch Diameter	519, 520
Rules Relative to the Circle	527
Tap Drill Sizes for Fractional Size Threads	517
Tapers and Angles	523
Temperature Conversion	526
Triangles	528
Weight	
Sheet Steel	525
Steel Bars	525
Wire Gage Standards	521
Reflecting Cubes, Croblox	389
Reflecting Targets, Croblox	389
Right Angle Targets	389
Rods, End Measuring	71-73
Rules	
Case	131, 146
with Circumference Measurement	144
Clamp	146
with Decimal Equivalents	145
with Drill Sizes	145
English Pattern	144
Folding	144
with Holder	143
Hook	141, 142
Metric	136-138
with Pocket Clip	144
Shrink	139, 140
Specifications	125-131
Stainless Steel	135
Standard Graduations	126, 127
Steel	125-145
Tapered End	143
Rule Cases	146
Rule Holder	147
Rust Preventing Lubricant	225, 226
Scratch Gages	232
Screw Drivers	258-260
Scribers	232, 233
Sets	
Automotive Service	88
Combination	151, 156-159
Dial Indicator	302
Metric Tools	88, 89
Micrometer	44, 45
Tools, Student and Apprentice	498
Special Tools	273-276

DESCRIPTION	PAGE
Speed Indicators	254, 255
Attachment	255
Squares	
Combination	151-155
Die Makers'	171, 172
Double Steel	169, 170
Draftsmen's T	166
Hardened Bevel Edge	168
Hardened Steel	167
"Reliable" Try	168
Thin Steel Try	167
True	388
Stainless Steel Outside Micrometers	31
Stair Gage Fixtures	261
Standard Reference Bars	393
Starrett Book for Student Machinists, The	504
Steel Measuring Tapes	278-289
Straight Edges	
Draftsmen's Steel	147
Steel	148
Student Book for Machinists	504
Student Notebook Pages	506
Surface Gages	
Sleeve, Universal	232
Toolmakers'	229
Universal	230, 231
Surface Plates, Granite	
Black	408, 409
Cleaner	417
Covers	417
Crystal Pink	405-408
Master Pink	402-404
Parallels	415
Relapping Services	418
Right Angle Blocks	416
Special Features	412
Special Sizes	411
Squares	413
Stands	410, 411
Straight Edges	414
Surface Inspection Gage	416
Technical Data	400, 401
Toolmakers' Flat	412
Tables—See Reference Tables	
Tap Wrenches	252, 253
Tapes, Steel Measuring	
General Information	278, 279
Hooks	288
"Oilgager"	284-286
Plumb Bobs, Oil Gaging	287
Satin Chrome and White	280-283
Special Graduations	289
Stainless Steel	279
Wiper	288
Temp-Chek Temperature Meters	391
Tester, Dial Indicator	321
Thermal Comparator	391
Tool and Instrument Oil	224
Tool Chests	90, 91
Training Aids, Educational and Vocational Material	497-507
Trammels	220-222
Transits	269, 270
True Squares	388
Utility Vises	440
V Blocks and Clamps	243-246
Vernier	
Calipers	96, 97
Depth Gages	113
Dial Vernier	275, 276
Features	93, 96
Gear Tooth Calipers	112
Height Gage Attachments	106
Height Gages	101-105
How to Read	94, 95
Vibrometer	350
Vises	
Combination	439
Combination Hand	247
Comparison Chart	442
Drill Press	441
Jaw Caps, Brass	442
Machinists	436-438
Milling Machine	441
Pin	248, 249
Sheetmetal	439
Toolmakers'	438
Utility	440
Vocational and Educational Material	497-507
Wiggler or Center Finder	227

Numerical Index

CATALOG NO.	DESCRIPTION	PAGE
1	Adjustable Jaw Cut Nippers	256
1X	Adjustable Jaw Cut Nippers, Tungsten Carbide Tipped Jaws	256
CA-1	CMM Check Clamp	428
CH 1	Chamois	391
COMP 1	Thermal Comparator	391
DM 1	Differential Measuring Tables	390
HD 1-820	Heavy Duty Gage Block Accessories	377
M-1.15	Bulk Spray Dispenser	226
M-1	All Purpose Lubricant	225, 226
RAT 1.L	Right Angle Target	389
RAT 1.W	Right Angle Target	389
RCM 1.0 WA1	Rect. Croblox Wear Block (Metric)	379
RTC 1-9	Optical Flat Reflecting Targets	389
SA 1-20	Square Gage Block Accessories	378
2	Outside Micrometers	28
2A	Outside Micrometers	29
CA-2	CMM Parallels	428
CH 2	Chamois	391
OFP 2	Optical Parallel Set	392
RCM 2.0 WA1	Rect. Croblox Wear Block (Metric)	379
SCM 2.0 WA1	Square Croblox Wear Block (Metric)	379
CA-3	CMM Small Probe Set	427
4	Screw Pitch Gage	194, 196
OFP 4	Optical Parallel Set	392
CA-5	CMM Layout Probe	425
RS 5	Rect. Steel Gage Blocks	370
6	Screw Pitch Gage	194, 196
AG 6	Angle Gage Blocks	386
8	Large Combination Squares	165
AG 8.TR	Angle Gage Blocks	386
SS 8	Square Steel Gage Blocks	374
SS 8.MA1X	Metric Square Steel Gage Blocks—Accessory Set	384
9	Combination Sets	156, 157
C9-12-4R	Satin Chrome Combination Sets	151, 156
RS 9	Rect. Steel Gage Blocks	370
RS 9.MA1	Mini-Metric Gage Block Set	380
11H	Combination Squares	152, 153
11HC	Combination Squares	154, 155
AC 11.A	Rect. Gage Block Accessory Set	378
AC 11.MA	Rect. Gage Block Accessory Set (Metric)	379
AG 11	Angle Gage Blocks	386
RC 11	Rect. Croblox Gage Blocks	369
12	Bevel Protractors	151, 160
13	Double Squares	169
013½	Utility Vise	440
AG 13.TR	Angle Gage Blocks	386
NA 13	Gage Block Stone	391
SAO 13	Gage Block Stone	391

CATALOG NO.	DESCRIPTION	PAGE
14	Double Steel Squares	170
014	Utility Vise	440
015	Utility Vise	440
AG 16	Angle Gage Blocks	386
RC 17.M	Thin Rect. Croblox Gage Blocks	381
RS 17.M	Thin Rect. Steel Gage Blocks (Metric)	382
SS 17.MA1	Thin Square Steel Gage Blocks (Metric)	384
18	Automatic Center Punch	236
18S	Spacing Attachment for Center Punches	236
CA-18-2	CMM Dust Cover	428
AG 18.TR	Angle Gage Blocks	386
19	Protractor	177
20	Hardened Steel Squares	167
RC .020 WA1	Rect. Croblox Wear Block	378
21	Thin Steel Try Square	167
RC 21	Rect. Croblox Gage Blocks	369
TS 21	True Square	388
22C	Drill Point Gage	186
CA-23	CMM Calibration Plate	428
SAO 23	Gage Block Stone	391
023½	Toolmakers' Utility Vise	438
DHG 25-85	Digi-Chek II Height Masters	394
SA 25.A	Square Gage Block Accessory Set	378
SA 25.MA	Square Gage Block Accessory Set (Metric)	379
25-106	Dial Indicator, Dial Master	300, 301
25-109	Dial Indicator	300, 301
25-111	Dial Indicator	300, 301
25-116	Dial Indicator	300, 301
25-118	Dial Indicator	300, 301
25-124	Dial Indicator	300, 301
25-128	Dial Indicator	300, 301
25-131	Dial Indicator	300, 301
25-134	Dial Indicator	300, 301
25-136	Dial Indicator	300, 301
25-138	Dial Indicator	300, 301
25-141	Dial Indicator	300, 301
25-142	Dial Indicator	300, 301
25-143	Dial Indicator	300, 301
25-144	Dial Indicator	300, 301
25-145	Dial Indicator	300, 301
25-161	Metric Dial Indicator	300, 301
25-181	Metric Dial Indicator	300, 301
25-209	Dial Indicator	300
25-211	Dial Indicator	300
25-218	Dial Indicator	300
25-224	Dial Indicator	300
25-228	Dial Indicator	300
25-231	Dial Indicator	300
25-234	Dial Indicator	300
25-236	Dial Indicator	300
25-238	Dial Indicator	300

CATALOG NO.	DESCRIPTION	PAGE
25-241	Dial Indicator	300
25-242	Dial Indicator	300
25-243	Dial Indicator	300
25-244	Dial Indicator	300
25-245	Dial Indicator	300
25-261	Metric Dial Indicator	300
25-281	Metric Dial Indicator	300
25-341	Dial Indicator	309
25-341/5	Dial Indicator	309
25-381	Metric Dial Indicator	309
25-431	Dial Indicator	309
25-441	Dial Indicator	309
25-441/5	Dial Indicator	309
25-481	Metric Dial Indicator	309
25-511	Dial Indicator	300, 301
25-611	Dial Indicator	300
25-631	Dial Indicator	309
25-781	Metric Dial Indicator	309
25-881	Metric Dial Indicator	309
25-2041	Dial Indicator	310
25-2081	Metric Dial Indicator	312
25-3041	Dial Indicator	310
25-3081	Metric Dial Indicator	310
25-4041	Dial Indicator	310
25-4081	Metric Dial Indicator	312
25-5041	Dial Indicator	310
25-5081	Metric Dial Indicator	312
25LC	Indicator Range Limit Cap	319
25R	Contact Point Set	317
25SB	Indicator Split Bushings	318
25SC	Split Collets	318
25W	Roller Contact Point	317
26	Firm Joint Outside Calipers	213
27	Firm Joint Inside Calipers	213
28	Dial Indicator Shock Absorbing Anvil Unit	317
RC 28	Rect. Croblox Gage Blocks	369
RS 28	Rect. Steel Gage Blocks	370
SS 28	Square Steel Gage Blocks	374
29	Scratch Gages	232
CA-30	CMM Chuck Probe Holder	426
31	Inspectors' Gage	55
CA-31	CMM Optical Viewing Screen	428
33H	Combination Squares	152, 153
33HC	Combination Squares	154, 155
33J	Combination Squares	165
RC 33	Rect. Croblox Gage Blocks	369
RCS 34	Rect. Croblox-Steel Gage Blocks	372
SC 34	Square Croblox Gage Blocks	373
SCS 34	Square Croblox-Steel Gage Blocks	372
SS 34	Square Steel Gage Blocks	374
36	Lock Joint Transfer Outside Calipers	215
RC 36	Rect. Croblox Gage Blocks	369
RS 36	Rect. Steel Gage Blocks	370
SC 36	Square Croblox Gage Blocks	373
SS 36	Square Steel Gage Blocks	374
37	Lock Joint Transfer Inside Calipers	215
38	Lock Joint Outside Calipers	214
RS 38	Rect. Steel Gage Blocks	370
39	Lock Joint Inside Calipers	214
40	Screw Pitch Gage	194, 196
42	Lock Joint Hermaphrodite Calipers	216
HD 42	Heavy Duty Gage Blocks	377
RS 43	Rect. Steel Gage Blocks	370
HD 44	Heavy Duty Gage Blocks	377
TS 44.TR	True Square	388
RC 45M	Metric Rect. Croblox Gage Blocks	381
RS 45M	Metric Rect. Steel Gage Blocks	382
R2C 45.M	Metric Rect. Croblox Gage Blocks	381
R2S 45.M	Metric Rect. Steel Gage Blocks	382
S2C 45.M	Metric Square Croblox Gage Blocks	383
S2S 45.M	Metric Square Steel Gage Blocks	384
HD 46	Heavy Duty Gage Blocks	377
47	Universal Bevel	180
49	Combination Bevel	180
50	Improved Trammels	220
HDC .050 A1	Individual Croblox Wear Block	377
RC .050 WA1	Rect. Wear Block	378
54	Hold Downs	241
55	Hardened Bevel Edge Squares	168
56	Toolmakers' Surface Gage	229
57	Universal Surface Gages	230
57S	Universal Sleeve	232
58S	Universal Sleeve	232
59	Trammels	221
61	"Reliable" Try Square	168
CA-61	CMM Electronic Probe Set	426
62	Rule Holder	147
CA-62	CMM Centering Microscope	428
63	Micrometer Heads	62
CA-64	CMM Clamp Set	428
66	Thickness Gages	203, 204
67	Improved Scriber	233
68	Adjustable Sleeve Scriber	233
70	Pocket Scribers	232
71	Thickness Gage	202, 204
72	Thickness Gage	202, 204
73	"Yankee" Inside Calipers	212
74	"Fay" Inside Calipers	211
75	"Fay" Outside Calipers	211
77	"Fay" Dividers	211
79	"Yankee" Outside Calipers	212
80	Miniature Dial Indicator Accessories	295
80SB	Split Bushing	318
80-series	Miniature Dial Indicators	294

CATALOG NO.	DESCRIPTION	PAGE
81-111	Dial Indicator	297
81-111-624	Dial Indicator	299
81-111-630	Dial Indicator	299
81-124	Dial Indicator	297
81-128	Dial Indicator	297, 298
81-131	Dial Indicator	297, 298
81-134	Dial Indicator	297, 298
81-136	Dial Indicator	297, 298
81-136-622	Dial Indicator	299
81-136-623	Dial Indicator	299
81-138	Dial Indicator	297, 298
81-141	Dial Indicator	297, 298
81-142	Dial Indicator	297, 298
81-143	Dial Indicator	297, 298
81-143-628	Dial Indicator	299
81-144	Dial Indicator	297, 298
81-145	Dial Indicator	297, 298
81-161	Metric Dial Indicator	297, 298
81-181	Metric Dial Indicator	297, 298
81-211	Dial Indicator	297
81-224	Dial Indicator	297
81-228	Dial Indicator	297
81-231	Dial Indicator	297
81-234	Dial Indicator	297
81-236	Dial Indicator	297
81-238	Dial Indicator	297
81-241	Dial Indicator	297
81-242	Dial Indicator	297
81-243	Dial Indicator	297
81-244	Dial Indicator	297
81-245	Dial Indicator	297
81-261	Metric Dial Indicator	297
81-281	Metric Dial Indicator	297
RC 81	Rect. Croblox Gage Blocks	369
RCS 81	Rect. Croblox-Steel Gage Blocks	372
RS 81	Rect. Steel Gage Blocks	370
SC 81	Square Croblox Gage Blocks	373
SCS 81	Square Croblox-Steel Gage Blocks	371, 372
SS 81	Square Steel Gage Blocks	374
82	Dial Bore Gages	345
83	"Yankee" Dividers	212
84	Dial Bore Gages	346, 347
HD 84	Heavy Duty Gage Blocks	377
RC 84	Rect. Croblox Gage Blocks	369
RS 84	Rect. Steel Gage Blocks	370
SC 84	Square Croblox Gage Blocks	373
SS 84	Square Steel Gage Blocks	374
85	Improved Extension Dividers	219
RC 85	Rect. Croblox Gage Blocks	369
RS 85	Rect. Steel Gage Blocks	370
SC 85	Square Croblox Gage Blocks	373
SS 85	Square Steel Gage Blocks	374
86	Combination Hand Vise	247
RS 86	Rect. Steel Gage Blocks	370
87	Mercury Plumb Bobs	268

CATALOG NO.	DESCRIPTION	PAGE
88	Ball Points	220
RC 88	Rect. Croblox Gage Blocks	369
RC 88.M	Metric Rect. Croblox Gage Blocks	381
RS 88	Rect. Steel Gage Blocks	370
RS 88.M	Metric Rect. Steel Gage Blocks	382
R2C 88.M	Metric Rect. Croblox Gage Blocks	381
R2S 88.M	Metric Steel Gage Blocks	382
SC 88	Square Croblox Gage Blocks	373
SS 88	Square Steel Gage Blocks	374
S2C 88.M	Metric Square Croblox Gage Blocks	383
S2S 88.MA1	Metric Square Steel Gage Blocks	384
91	Tap Wrenches	253
92	Dividers	219
RS 92	Rect. Steel Gage Blocks	370
93	T-Handle Tap Wrenches	252
98	Mechanics' Improved Levels	263
99	Transits	269, 270
C100-series	Satin Chrome Shrink Rules	139, 140
HDC .100 WA1	Individual Croblox Wear Block	377
RC .100 WA1	Individual Rect. Wear Block	378
SC .100 WA1	Individual Croblox Wear Block	378
101C	Leveling Instruments	271
JC 103	Brass Vise Jaw Caps	442
JC 103½	Brass Vise Jaw Caps	442
JC 104	Brass Vise Jaw Caps	442
JC 104½	Brass Vise Jaw Caps	442
JC 105	Brass Vise Jaw Caps	442
104	Speed Indicator	254
107	Registering Speed Indicator	255
108	Line Level	267
109	Surface Speed Attachment	255
110	Gage Holder	197, 198
111	Stair Gage Fixtures	261
RC 112.M	Metric Rect. Croblox Gage Blocks	381
RS 112.M	Metric Rect. Steel Gage Blocks	382
R2C 112.M	Metric Rect. Croblox Gage Blocks	381
R2S 112.M	Metric Rect. Steel Gage Blocks	382
S2C 112.M	Metric Square Croblox Gage Blocks	383
S2S 112.MA1	Metric Square Steel Gage Blocks	384
116	Nail Sets	240
117	Center Punches	237
118	Spacing Center Punch	238
119	Heavy Duty Bench Block	251
120	Dial Calipers	92
120D	Dial Caliper Attachment	92
121	Tubular Inside Micrometers	81
123	Satin Chrome Master-Vernier Caliper	96, 97
124	Inside Micrometers	76, 77
128	Inside Micrometers	74, 75
128	Combination Head	75
129	Bench Block	251
130	Bench Level	267
132	Bench Levels	264

CATALOG NO.	DESCRIPTION	PAGE
133	Engineers' and Plumbers' Levels	265
134	Cross Test Level and Plumb	266
135	Pocket Levels	267
136	Cross Test Level	266
C-137	CMM Edge Finder Probe	427
C-138–C-147	CMM Conical Probes	427
139	Firm Joint Dividers	217
CSA-140	CMM Foot Switch	428
148	CMM Layout Probe	427
149	Tubular Hacksaw Frame	472
C-150	CMM Straight Probe	427
151	Hacksaw Frame	472
152	Hacksaw Frame	472
154	Adjustable Parallels	150
155	Screw Pitch Gage	193, 196
156M	Screw Pitch Gage	195, 196
158M	Screw Pitch Gage	195, 196
159M	Screw Pitch Gage	195, 196
160	Toolmakers' Steel Clamps	241
C-160–C-162	CMM Ball Probes	427
161	Toolmakers' Parallel Clamps	242
162	Pin Vises	248
163	Draftsmen's T-Squares	166
C-163	CMM Inside Probe	427
165	Double End Pin Vise	249
166	Pin Vises	248
167	Radius Gages	197-199
167M	Metric Radius Gages	197-199
170	Dial Sheet Gage	347
172	Thickness Gages	202-204
173	Metric Thickness Gages	204
174	Tap Wrench	253
175RLZ	Inspectors' Micrometer Caliper Gage	55
177	Steel Plumb Bobs	268
178	Radius Gages	199
179	Outside Thread Calipers	218
182	Protractor	178
C183	Satin Chrome Protractor	178
184	Inside Thread Calipers	218
185	Tap and Drill Gage	187
186	Drill and Wire Gage	188
187	Jobbers' Drill Gage	188
188	English Standard Wire Gage	189
190	"Little Giant" Jack Screws	250
191	"Little Giant" Jack Screws	250
192	Vibrometer	350
193	Protractor	180
196	Universal Dial Test Indicator	331, 332
196M	Universal Dial Test Indicator (Metric)	331, 332
196M2	Universal Dial Test Indicator (Metric)	331, 332
198	Letter Size Drill Gage	187
199Z	Master Precision Level	262
200M	Metal Tool Chests	288, 289
204L	Quick Adjusting Outside Micrometer	27

CATALOG NO.	DESCRIPTION	PAGE
205	Steel Mill Outside Micrometer	51
206	Micrometer Stand	41
207	Can Seam Micrometer	56
208	Can Seam Micrometer	56
209RL	Can Curl Micrometer	56
210	Screw Thread Comparator Outside Micrometer	50
211P	Rounded Anvil Outside Micrometer	53
212	Outside Micrometer Attachment	30
216	Digital Micrometers	18, 19
220	Mul-T-Anvil Outside Micrometers	20, 21
221	Hi-Precision Outside Micrometer	22
222	Sheet Metal Outside Micrometers	52
223RL	Paper Gage Outside Micrometer	54
224	Outside Micrometers	42, 43
T225F	Wire Micrometer	26
226	Outside Micrometers	34, 35
S226	Outside Micrometer Sets	44, 45
227	Screw and Wire Gage	191
228	Hub Outside Micrometer	54
229	Telescoping Gages	121
230	Outside Micrometers	16, 17
232	Outside Micrometers	15
234	End Measuring Rods	71
235	Adjustable Jaw Cut Nippers	257
235X	Cut Nipper with Tungsten Carbide Tipped Jaws	257
C235	Alignment Rail	428
236	Depth and Angle Gage	115
236H	Depth and Angle Gages	115
237	Rule Depth Gages	114
238	Heavy Duty Outside Micrometers	27
239	Heavy Duty Outside Micrometers	33
240	Pin Vises	249
241	Firm Joint Hermaphrodite Calipers	216
243	Firm Joint Hermaphrodite Calipers	217
244	Precision End Measuring Rods	72, 73
245	Engineers' Gage	208
246	Planer and Shaper Gage	185
247	Outside Micrometer Ball Attachment	30
248	Drive Pin Punches	239
249	Screw Slotting Hacksaw Blades	474
250	Dial Height Gage	100
250D	Depth Attachment	106
C251	Trammel, Satin Chrome	222
252	Height Transfer Gages	110, 111
253	Dial Indicator Set	302
254	Satin Chrome Master-Vernier Height Gages	102, 103
254	Depth Gage Attachment	106
254	Straight Scribers	106
255	Satin Chrome Vernier Height Gages	101

CATALOG NO.	DESCRIPTION	PAGE
255TC	Depth Gage Attachments for Vernier Height Gages	106
256	Disc Type Micrometers	24
257	Universal Surface Gages	231
258	Digi-Chek Height Gages	107, 108
258R	Riser Blocks	109
258RRB	Reverse Reading Blocks	109
259	Dial Height Gage	99
260Z	Groove Micrometer	26
261L	Micrometer Head	61
262	Micrometer Heads	61
263	Micrometer Heads	57, 58
V263MRL	Metric Micrometer Head	57, 58
264	Center Punches	237
267	Taper Gage	209
268	V Blocks and Clamp	243
269	Taper Gage	208
270	Taper Gage	209
271	V Blocks and Clamp	243
272	Radius Gages	200
274	Toolmakers' Inside Calipers	210
275	Toolmakers' Outside Calipers	210
277	Toolmakers' Dividers	210
278	V Blocks and Clamps	244
279	Radius Gage	200
280	Piano Tuners' Gage	190
281	American Standard Wire Gage	189
CA-282	CMM Probe Adapter	426
283	U.S. Standard Gage	190
284	Acme Screw Thread Gage	192
286	Drill and Steel Wire Gage	188
287	Steel Wire Gage	189
289	Attachments for Combination Squares	163
289C	Height Gage and Depth Gage Set for Combination Squares	164
K290	Hole Saw Kit	480
K291	Hole Saw Kit	480
K292	Hole Saw Kit	480
293	Rolling Mill Caliper Gage	124
295	Steel Music Wire Gage	190
298	Key Seat Clamps	146
299	Rule Clamp	146
C303R	Satin Chrome Steel Rules	134
C303SR	Satin Chrome Steel Rules	135
C304R	Satin Chrome Steel Rules	134
C304SRE	Satin Chrome Steel Rules	135
C305R	Satin Chrome Steel Rules	134
C306R	Satin Chrome Decimal Rules	134
CA-306	CMM Probe Box	428
C309R-6	Satin Chrome Steel Rule	134
C310K-6	Rule with Pocket Clip	144
C310R-6	Satin Chrome Steel Rules	134
C310T-6	Tapered Rule	143
C316R	Satin Chrome Steel Rules	134
323½	Combination Vise	439
324½	Combination Vise	439

CATALOG NO.	DESCRIPTION	PAGE
325	Combination Vise	439
326	Combination Vise	439
C330	Satin Chrome Steel Rules (Metric)	138
C331	Satin Chrome Steel Rules (Metric)	138
C334-series	Satin Chrome Steel Rules (Metric)	138
C335S-300	Satin Chrome Steel Rule (Metric)	138
C359	Universal Bevel Protractor, Satin Chrome	175
363	Digital Micrometer Heads	60
C364	Universal Bevel Protractor, Satin Chrome	176
CA-366	CMM Alignment Rail	428
CA-367	CMM Cabinet Stand	428
C368	Satin Chrome Shrink Rules	140
C369	Satin Chrome Shrink Rules	140
C370	Satin Chrome Shrink Rules	139, 140
C374	Satin Chrome Shrink Rules	139, 140
C375	Satin Chrome Shrink Rules	139, 140
C376-12	Satin Chrome Shrink Rules	139
C377	Satin Chrome Shrink Rules	140
378-12	Satin Chrome Shrink Rules	140
380	Straight Edges	148
384	Steel Parallels	149
385	Straight Edges	148
386	Draftsmen's Steel Straight Edges	147
TC386	Temperature Meter	391
387	Straight Edges	148
C389	Satin Chrome Shrink Rules	139, 140
C391	Center Gage	192
392	Center Gage Attachment	192
C396	Center Gage	192
C398M	Center Gage	192
C-401	CMM Edge Finder Probe	427
C404R	Satin Chrome Steel Rules	133
CH404R	Satin Chrome Hook Rules	142
414	Rules, English Pattern	144
C-416	CMM Edge Finder Probe	427
C416R	Satin Chrome Steel Rules	133
CH416R	Satin Chrome Hook Rules	142
423	Rules with Holder	143
424	Circumference Gage & Pocket Slide Caliper	124
424½	Sheetmetal Vise	439
425	Pocket Slide Calipers	122
433	Combination Sets	156, 157
434	Combination Sets	158, 159
435	Combination Sets	158, 159
436	Outside Micrometers	32, 36-40
S436	Outside Micrometer Sets	44, 45
439	Combination Tool	166
440	Micrometer Depth Gages	84-86
443	Micrometer Depth Gage	86
445	Micrometer Depth Gages	84-86
446	Digital Micrometer Depth Gages	87
448	Vernier Depth Gages	113
449	Micrometer Depth Gages	83

CATALOG NO.	DESCRIPTION	PAGE
450	Dial Depth Gage	116
452	Cylinder Gages	350
453	Die Makers' Squares	171
454	Satin Chrome Vernier Height Gages	104, 105
454	Depth Gage Attachments for Height Gages	106
454	Scribers for Height Gages	106
456	Gear Tooth Vernier Calipers	112
457	Die Makers' Squares	172
459	Cutter Clearance Gage	181
461	Micrometer Heads	66
462	Micrometer Heads	66
463	Micrometer Heads	57, 58
464P	Micrometer Head	57
465	Micrometer Heads	64
466	Angle Gage	201
467	Thickness Gage	203, 204
468	Micrometer Heads	65
469	Micrometer Heads	67
470	Stair Gage Fixtures	261
471	Folding Rule	144
472	Screw Pitch Gage	193, 196
473	Screw Pitch Gage	194, 196
474	Screw Pitch Gage	194, 196
475	Screw Pitch Gage	193, 196
476	Screw Pitch Gage	195, 196
479	Rolling Mill Gage	191
483	Outside Micrometer, V-Anvil	23
485	Outside Micrometer, V-Anvil	23
486	Blade Type Micrometer	25
490	Bevel Protractors	151, 160
491	Bevel Protractors	151, 160
492	Bevel Protractors	151, 160
493	Protractor and Depth Gage	179
493B	Satin Chrome Protractor and Depth Gage	179
494	Toolmakers' Buttons	227
496	Oil Hardening Precision Ground Flat Stock	487-490
497	Air Hardening Precision Ground Flat Stock	491-493
498	Low Carbon Precision Ground Flat Stock	494, 496
HG 501.3M	Reverse Reading Block (Metric)	395
HG 501.4M	Base Block (Metric)	395
507	Satin Chrome "Oilgager" Steel Tapes	284
508	Satin Chrome "Oilgager" Steel Tapes	285
514	Tape Hooks	287
515	Oil Gaging Plumb Bobs	286
520	Stainless Steel Tapes	279
HG 525.60	Reverse Reading Block	395
HG 525.61	Base Block	395
530	Satin Chrome Steel Tapes	280, 281
W530	White Steel Tapes	282, 283

CATALOG NO.	DESCRIPTION	PAGE
552	Opticians' Screw Driver and Holder	259
553	Pocket Screw Drivers	260
554	Eyeglass Screw Driver	259
555	Jewelers' Screw Drivers	258
559	Pocket Screw Drivers	260
563	Firm Joint Hermaphrodite Calipers	217
564	"Universal Junior" Test Indicator	334
565	Drive Pin Punches	239
567	V Block and Clamp	245
568	V Blocks and Clamps	246
569	Tube Outside Micrometers	52
571	Thickness Gages	203, 204
575	Screw Thread Outside Micrometers	49
576	Rounded Anvil Outside Micrometers	53
577	Rounded Anvil Outside Micrometer	53
579	Telescoping Gages	120
585	Screw Thread Outside Micrometers	49
596	Pencil Divider	220
599	Planer and Shaper Gage	184
C601	Satin Chrome Rules	132
604R	Steel Rules	132
C604R	Satin Chrome Steel Rules	132
C604RE	Satin Chrome Rules	132
CD604R	Satin Chrome Hook Rules	142
DH604R	Hook Rules	141, 142
H604R	Hook Rules	141, 142
CH604R	Satin Chrome Hook Rules	142
C606R	Satin Chrome Decimal Rules	132
C607R	Steel Rules	132
610N	Steel Rules	133
C610N-6	Satin Chrome Steel Rule	133
H610N	Hook Rules	141, 142
CH610N-6	Satin Chrome Hook Rule	142
611N-6	Steel Rules	133
C616R	Satin Chrome Rules	132
C622R-6	Rule, with Decimal Equivalents	145
C623R-6	Rule, with Drill Sizes	145
DHG 625-2150	Metric Digi-Chek II Height Master	394
635N-150	Steel Rule (Metric)	138
C635	Satin Chrome Steel Rules (Metric)	138
C635E-150	Satin Chrome Steel Rule (Metric)	138
C636	Satin Chrome Steel Rules (Metric)	138
C637-150	Satin Chrome Steel Rule (Metric)	138
C637E-150	Satin Chrome Steel Rule (Metric)	138
640	Dial Depth Gages	349
643	Dial Depth Gages	349
643½	Machinists' Vise	438
644	Dial Depth Gages	349
644½	Machinists' Vise	438

CATALOG NO.	DESCRIPTION	PAGE
645	Universal Heavy Duty Dial Test Indicator	333
646	Machinists' Vise	438
652	Universal Dial Bench Gage	344
653	Dial Comparators	343
654	Inspectors' Dial Bench Gage	344
655-111	Dial Indicator	303, 304
655-118	Dial Indicator	303, 304
655-124	Dial Indicator	303, 304
655-128	Dial Indicator	303, 304
655-129	Dial Indicator	303, 304
655-131	Dial Indicator	303, 304
655-134	Dial Indicator	303, 304
655-136	Dial Indicator	303, 304
655-138	Dial Indicator	303, 304
655-141	Dial Indicator	303, 304
655-142	Dial Indicator	303, 304
655-143	Dial Indicator	303, 304
655-144	Dial Indicator	303, 304
655-145	Dial Indicator	303, 304
655-161	Metric Dial Indicator	303, 304
655-181	Metric Dial Indicator	303, 304
655-211	Dial Indicator	303
655-224	Dial Indicator	303
655-228	Dial Indicator	303
655-229	Dial Indicator	303
655-231	Dial Indicator	303
655-234	Dial Indicator	303
655-236	Dial Indicator	303
655-238	Dial Indicator	303
655-241	Dial Indicator	303
655-242	Dial Indicator	303
655-243	Dial Indicator	303
655-244	Dial Indicator	303
655-245	Dial Indicator	303
655-261	Metric Dial Indicator	303
655-281	Metric Dial Indicator	303
655-341	Dial Indicator	309
655-341/5	Dial Indicator	309
655-441	Dial Indicator	309
655-441/5	Dial Indicator	309
655-511	Dial Indicator	302, 303
655-611	Dial Indicator	303
655-881	Metric Dial Indicator	309
655-2041	Dial Indicator	310
655-2081	Metric Dial Indicator	312
655-3041	Dial Indicator	310
655-3081	Metric Dial Indicator	312
655-4041	Dial Indicator	310
655-4081	Metric Dial Indicator	312
655-5041	Dial Indicator	310
655-5081	Metric Dial Indicator	312
656-109	Dial Indicator	306
656-111	Dial Indicator	306
656-118	Dial Indicator	306
656-124	Dial Indicator	306
656-128	Dial Indicator	306, 307
656-129	Dial Indicator	306, 307
656-131	Dial Indicator	306, 307
656-134	Dial Indicator	306, 307
656-136	Dial Indicator	306, 307
656-138	Dial Indicator	306, 307
656-141	Dial Indicator	306, 308
656-142	Dial Indicator	306, 307
656-143	Dial Indicator	306, 307
656-144	Dial Indicator	306, 308
656-145	Dial Indicator	306, 308
656-161	Metric Dial Indicator	306, 308
656-181	Metric Dial Indicator	306, 308
656-209	Dial Indicator	306
656-211	Dial Indicator	306
656-224	Dial Indicator	306
656-228	Dial Indicator	306
656-229	Dial Indicator	306
656-231	Dial Indicator	306
656-234	Dial Indicator	306
656-236	Dial Indicator	306
656-238	Dial Indicator	306
656-241	Dial Indicator	306
656-242	Dial Indicator	306
656-243	Dial Indicator	306
656-244	Dial Indicator	306
656-245	Dial Indicator	306
656-261	Metric Dial Indicator	306
656-281	Metric Dial Indicator	306
656-341	Dial Indicator	309
656-341/5	Dial Indicator	309
656-441	Dial Indicator	309
656-441/5	Dial Indicator	309
656-511	Dial Indicator	309
656-517	Dial Indicator	309
656-611	Dial Indicator	306
656-617	Dial Indicator	309
656-881	Metric Dial Indicator	309
656-2041	Dial Indicator	310
656-3041	Dial Indicator	310
656-4041	Dial Indicator	310
656-5041	Dial Indicator	310
656-6041	Dial Indicator	311
656-7041	Dial Indicator	311
656-8041	Dial Indicator	311
656-9041	Dial Indicator	311
656-10041	Dial Indicator	311
656-11041	Dial Indicator	311
656-12041	Dial Indicator	311
657	Magnetic Base Indicator Holders	335-339
657T, U	Flex-O-Post Indicator Holder	339
657W	Flex-O-Post Fine Adjustment	339
659	Magnetic Base Indicator Holder	340
663	Heavy Duty Micrometer Heads	63
665	Dial Test Indicator	341

CATALOG NO.	DESCRIPTION	PAGE
666	Thickness Gage or Feeler Stock—20' and 25' Rolls	206, 207
667	Thickness Gage or Feeler Stock—12" Lengths	205, 206
670	Dial Indicator Hole Attachments	315
671	Dial Indicator Universal Attachment	315
672	Universal Indicator Back	314
673Z	Bench Micrometer	69, 70
674	Dial Indicator Back with Adjustable Mounting Bracket	314
675	Dial Test Indicators	342
676	Magnetic Backs for AGD Dial Indicators	315
677Z	Bench Micrometer	68
680	Saw Tension Gage	471
681	Out-of-Roundness Gage	351
696	Crankshaft Distortion Dial Gage or Strain Gage	352, 353
697	Inside Dial Gage	351
700	Inside Micrometer Calipers	82
701	Internal Groove Micrometer	82
705	Tape Wiper	287
SA708	Internal Measuring Machine Jaws	374
710	Ball and Diameter Gage	200
711	Last Word Dial Test Indicator Attachments	330
711D-10	Last Word Dial Test Indicator	329
711F, H	Last Word Dial Test Indicator	326
711G, L	Last Word Dial Test Indicator	327
711T-1	Last Word Dial Test Indicator	328
716	Dial Indicator Tester	321
720	QC Computer and Accessories	91
722	Electronic Digital Caliper	90
722D	Depth Attachment	90
724L	Tubular Outside Micrometers	46, 47
725L	Tubular Outside Micrometers	48
736L	Tubular Outside Micrometers	47
754	Electronic Height Gage	98
800	Nail Sets	240
806	Thickness Gage Holders	207
812	Electronic Gage Amplifiers, Meter Display	322, 323
812	Electronic Gage Amplifiers, Digital Display	324, 325
812-1Z	Lever Type Gaging Head	325
812-2Z	Cartridge Type Gaging Head	325
812-4	Height Gage and Comparator Attachment	325
812-5Z	Calibration Gage Block Set	323, 325
815	Toolmakers' Hammer	233
816	Prick Punches	238
818	Automatic Center Punches	234
819	Automatic Center Punches	235
823	Tubular Inside Micrometers	78, 79
824	Inside Micrometers	80
827	Edge Finders	228
828	Wiggler or Center Finder	227
829	Small Hole Gages	119
830	Small Hole Gages	117, 118
831	Small Hole Gages	117, 118
S901Z	Set of Tools	498
S902BZ	Set of Tools	498
S905Z	Set of English Tools	88
S905MZ	Set of Metric Tools	88
S906Z	Set of English Tools	89
S906MZ	Set of Metric Tools	89
S907Z	Set of English Tools	89
S907MZ	Set of Metric Tools	89
910	Outside Micrometer Case	38
912	Outside Micrometer Case	38
913	Outside Micrometer Case	38
913½	Drill Press Vises	441
S917Z	Automotive Service Set	88
923	Machinists' Vises	437
923½	Machinists' Vises	437
924	Machinists' Vises	437
924½	Machinists' Vises	437
925	Machinists' Vises	437
926	Machinists' Vises	437
995	Universal Precision Gage	182, 183
999	Leveling Rods and Targets	272
1010	Dial Indicator Pocket Gages	348
1015	Portable Dial Hand Gages	348
1024	Milling Machine Vise	441
1025	Stainless Steel Pocket Slide Calipers	122
1026	Milling Machine Vise	441
1027	Milling Machine Vise	441
C-1049-C-1053	CMM Ball Probes	427
1100	Heavy Duty Diameter Gage	364
CA-1100	CMM Electronic Probe Set	426
1101	Dial Diameter Gage	361, 362
1102	Dial Diameter Gage	358, 359
1126	Setting Master	362, 363
1127	Setting Master	360
1150Z	Dial Snap Gage	356, 357
1175Z	Dial Groove Gage	354, 355
1212	Stainless Steel Outside Micrometers	31
1223	Dial Indicator Vernier Caliper	275, 276
1230	Stainless Steel Outside Micrometers	31
1263	Stainless Steel Micrometer Heads	59
1309R-6	Steel Rule	135
1463	Stainless Steel Micrometer Heads	59
1604R	Steel Rules	135
1610	Kleenscribe Layout Dye	223
CA-1610	CMM Computer	424
1611	Kleenscribe Layout Dye	223
1612	Rule Case	146
1620	Tool and Instrument Oil	224

CATALOG NO.	DESCRIPTION	PAGE
1634	Rule Case	146
1700	Student Book	502
1701	Training Aid Kit	502
1702	Educational Charts	504
1715	Student Notebook Pages	504
1716	Film—The Outside Micrometer	499
1719	Film—The Combination Set	499
1722	Film—The Combination Square	500
1725	Film—The Bevel Protractor	500
1728	Film—The Vernier Caliper	500
1731	Film—The Vernier Height Gage	501
C-2002, C-2006	CMM Accessories for CA-1000	426
C-2050	CMM Mounted Sphere	426
C-2055	CMM Ring Gage	426
C-2118–C-2133	CMM Accessories for CA-1000	426
CA-2559	CMM Computer	424
RCS2828-18–RCS7648-32	CMM Rapid Check Systems	423
CA-8510	CMM Computer	424
CS 9168	Case for Square Gage Block Accessories	373
GF-series	Grey-Flex Hacksaw Blades	475
BS-series	Bluestripe Hacksaw Blades	474
RS-series	Redstripe Hacksaw Blades	473, 476, 477
SF-series	Greenstripe Hacksaw Blades	474, 476, 477
GHE6-24	Blades for Portable Band Saw Machines	458
GHS10	Blades for Portable Band Saw Machines	458
GPR6-24	Blades for Portable Band Saw Machines	458
HE10-24	Blades for Portable Band Saw Machines	458
HS10-24	Blades for Portable Band Saw Machines	458
PR10-24	Blades for Portable Band Saw Machines	458
H0-series	Hole Saws	479, 481
D0-series	Diamond Hole Saws	479, 481
X0-series	Carbide Grit Hole Saws	479, 481
A1–A11	Arbors, Hole Saw	482, 483
XA1–XA11	Arbors, Hole Saw	482, 483
A014C	Pilot Drill	483
A014D	Pilot Drill	483
XA014C	Pilot Drill, Carbide Tipped	483
XA014D	Pilot Drill, Carbide Tipped	483
A15	Arbor, Extension	483
MA02, 03, 04, 05, 06	Morse Taper Adaptors	483

TALK TO YOUR INDUSTRIAL DISTRIBUTOR

He Saves You Money Eight Ways

1 He's a local businessman—he knows your company, your products, your requirements.

2 He warehouses the tools, supplies and equipment you need to get the job done.

3 He cuts down paperwork by combining items on orders, receiving reports, invoices.

4 He works to meet your delivery schedule and expedites before he's asked.

5 He's got technical know-how to help you solve problems everywhere in the plant.

6 He calls in factory specialists whenever you need their advice.

7 He's the finest ally you could ask for when shop emergencies come up.

8 He's right on t[illegible] when you want him—[illegible] as the dial on your phon[illegible]

In 1880 Laroy S. Starrett started this company with an inventive mind and hard work. Over the years the integrity of the founder and of his products allowed the company to grow to what it is today....with the unfailing help of "the trade." From the beginning he backed product performance and personal integrity with a profound belief in the unique marketing services provided by distributors throughout the world.

1880 Sta 100th
Y0-CIC-663

Starrett®

The L. S. Starrett Company
Athol, Massachusetts 01331, U.S.A.